AD-A069 482 KIMBALL (L ROBERT) AND ASSOCIATES EBENSBURG PA F/G 13/2
NATIONAL DAM SAFETY PROGRAM. CUBA LAKE DAM, (INVENTORY NUMBER N--ETC(U)
JUL 78 R J KIMBALL DACW51-78-C-0025

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1 OF 2
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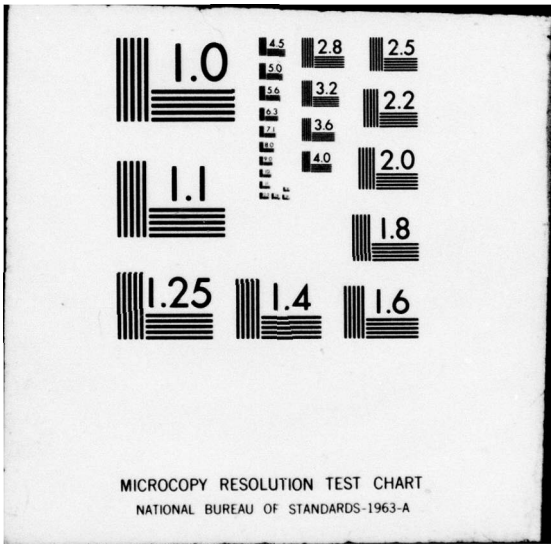
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Cuba Lake Dam
Allegany River Basin, Allegany County, N.Y
Inventory No. N.Y. 455

5. TYPE OF REPORT & PERIOD COVERED
Phase I Inspection Report
National Dam Safety Program

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R. Jeffrey Kimball P.E. (15)

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615 W. Highland Avenue
Ebensburg, Pennsylvania

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Visual Inspection
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Oil Creek
Cuba Lake Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Cuba Lake Dam was judged to be unsafe-non emergency due to seepage through embankment.

411 059

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

01 02

201500Z PP PP UUUU JUL 78

NO

DISTRICT ENGINEER, CORPS OF ENGINEERS

XX NEW YORK DISTRICT, NEW YORK 10007

TO: HONORABLE HUGH L. CAREY

GOVERNOR OF NEW YORK

ALBANY, NEW YORK 12224

INFO: MR. GEORGE KOCH

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL

CONSERVATION

50 WOLF ROAD

ALBANY, NEW YORK 12233

UNCLAS

ENGINEERS FROM THE CONSULTING FIRM OF L. ROBERT KIMBALL AND AS ASSOCIATES, UNDER CONTRACT TO THE NEW YORK DISTRICT, CORPS OF ENGINEERS INSPECTED THE CUBA LAKE DAM AND SPILLWAY, ALLEGHENY COUNTY, NEW YORK (I.D. NO. 455-456) ON 12 JUNE 1978 AS PART OF THE NATIONAL DAM INSPECTION PROGRAM.

VISUAL INSPECTION OF THE EARTH FILL DAM REVEALED A HIGH QUANTITY OF THRU SEEPAGE, HIGH ON THE SLOPE OF THE DOWNSTREAM FACE. THE SEEPAGE OBSERVED WAS NOT MENTIONED IN PREVIOUS INSPECTION REPORTS REVIEWED BY

JEROME CASEE, Civil Engineer, NANEN-F
X-9111

CLARK H. BENN, COL, DE, NAN X-0100

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52 02

2015002

UNCLAS

THE CONSULTANT. IN ADDITION, THE UPSTREAM AND DOWNSTREAM SLOPES ARE UNUSUALLY STEEP AT 1½ HORIZONTAL ON 1 VERTICAL.

WE CONSIDER THE ABOVE TO REPRESENT AN UNSAFE CONDITION REQUIRING IMMEDIATE ATTENTION AND ANALYSIS AS INDICATED BELOW BY THE OWNER, THE STATE OF NEW YORK, DEPARTMENT OF PARKS AND RECREATION.

1. THE OWNER SHOULD UNDERTAKE A PROGRAM OF TEST BORINGS AND LABORATORY ANALYSIS TO DETERMINE THE ZONING OF THE DAM AND ENABLE STABILITY AND SEEPAGE CALCULATIONS TO BE PERFORMED.

2. PIEZOMETERS SHOULD BE SET IN THE EMBANKMENT TO MONITOR PORE PRESSURES.

3. WEIR PONDS SHOULD BE ESTABLISHED TO MONITOR SEEPAGE.

4. THE CAUSE OF SEEPAGE SHOULD BE DETERMINED AND CONTROLLED.

cf:
Barbero
Weiss
Iarrobino (NAD)
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ALLEGANY RIVER BASIN

(24)

CUBA LAKE DAM

LEVEL II

ALLEGANY COUNTY, NEW YORK
INVENTORY NUMBER NY 455

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

Prepared by

L. ROBERT KIMBALL and ASSOCIATES
615 W. Highland Ave. Ebensburg, Pa.

Prepared For

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
NEW YORK, NEW YORK

Table of Contents

Phase I Report
National Dam Safety Program

Name of Dam: Cuba Lake Dam

State Located: New York

County Located: Allegany County

Stream: Oil Creek

Date of Inspection: June 12, 1978

ASSESSMENT

Based on our visual inspection and the lack of data on Cuba Lake Dam immediate detailed engineering studies are necessary to determine and evaluate the safety of Cuba Lake Dam and its downstream exposure. The exceptionally thick growth and large trees on the slopes obscures much of the embankment. Significant movement of the upstream slope and rip rap were noted from the tree growth. The large trees probably have deep root systems which may act as passages for water flow. Moderate and concentrated seepage areas were noted on the embankment above the downstream toe. These seepage zones are significant particularly in view of the fact that two prior inspections in the last 1 1/2 years have not mentioned this seepage. It is possible that the seepage has substantially increased since that time. No information is available on the puddled clay core or the outer zones. The slopes are excessively steep. A detailed stability and seepage analysis should be performed and include test borings, laboratory testing and monitor installations.

Routine, frequent inspections of the dam should be made particularly in areas where concentrated seepage was noted. The seepage flow quantities should be monitored. If the flow increases immediate action should be taken to control the seepage.

Seepage was noted at the discharge of one of the drain pipes. This seepage should be investigated. The potential for relieving the pressure on the pipes through the embankment should be evaluated.

Total removal of root systems appears to be impractical as they are probably deep into the embankment and total removal may result in destruction of the of the embankment. Clearing of the embankment and surface roots, placement of a filter, drainage system and buttress appears to be the most practical solution. Results of future studies should dictate to what extent vegetation is removed and what remedial modifications are necessary.

The hydrologic analysis indicated that the emergency spillway will pass the PMF with a remaining freeboard of 3.8 feet.

In summary the dam can be classified as "unsafe - with deficiencies if left uncorrected could result in failure" and categorized as a "non-emergency" situation based on definitions provided by the Corps of Engineers. This is not to imply that immediate action should not be taken.

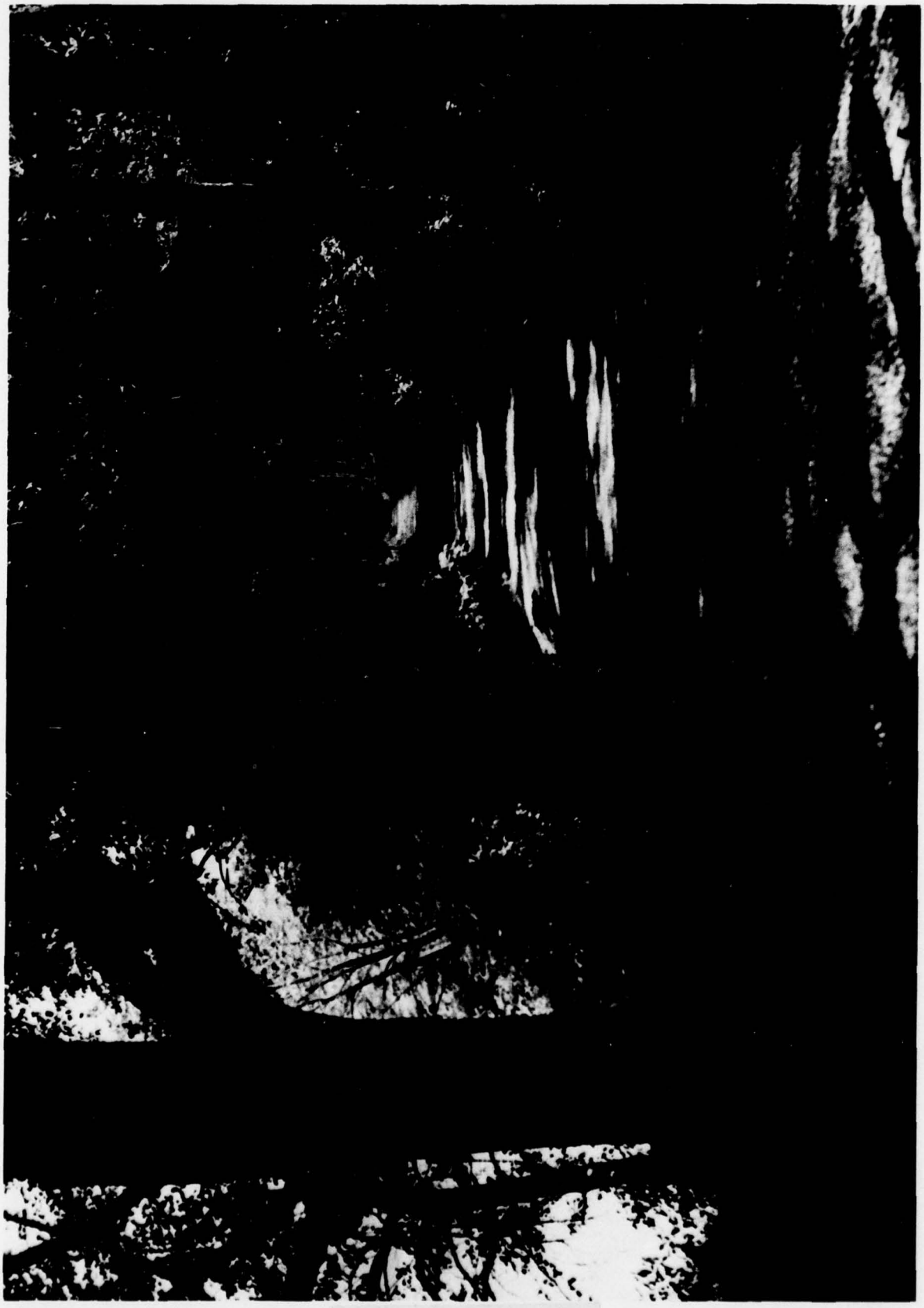
Approved by: R. Jeffrey Kimball

R. Jeffrey Kimball, P.E.
L. ROBERT KIMBALL & ASSOCIATES
Registration No. PA 26275E

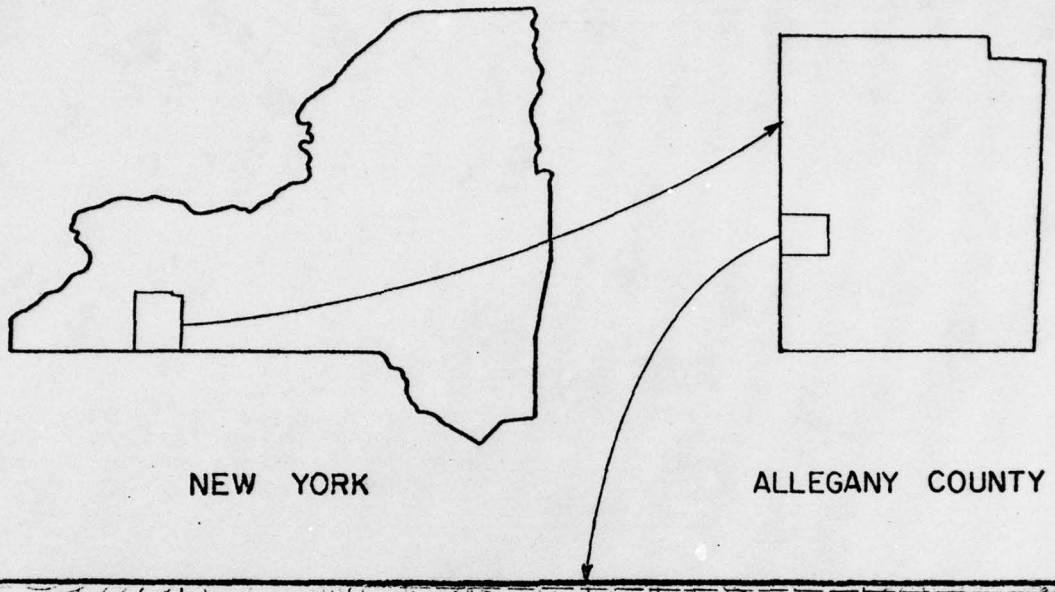
Approved by: Clark H. Benn

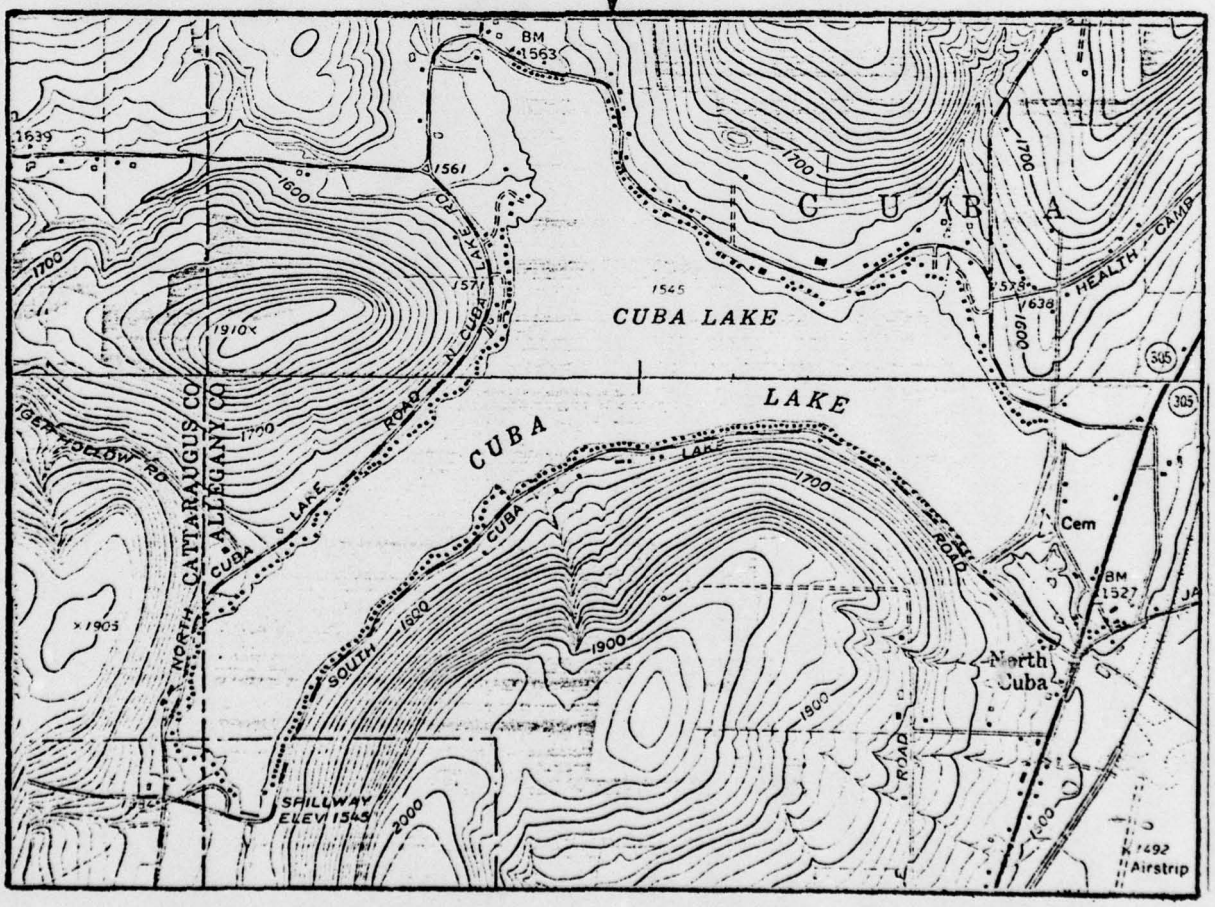
CLARK H. BENN
Colonel, Corps of Engineers
District Engineer

Date: 31 July 1978



OVERVIEW OF DAM CREST
FROM RIGHT ABUTMENT





Portion of Cuba and Rawson U.S.G.S. 7.5 Minute Quadrangles

CUBA LAKE DAM

SITE LOCATION MAP

SCALE : 1" = 2000'

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
CUBA LAKE DAM ID #455

SECTION I PROJECT INFORMATION

1.1 General:

a. Authority: Authority is provided by the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Project: Evaluation of non-Federal dams to identify dams which are a threat to life and property.

1.2 Description of Project:

a. Description of Dam and Appurtenances: Cuba Lake dam is an earth fill dam,possibly with a clay puddle core. The dam is 55 feet high with slopes steeper than 2:1 and an 8 foot crest width. The dam is 1,750 feet long. The upstream slope is rip rapped and both slopes are heavily vegetated with large mature trees.

The emergency spillway is located approximately 2 miles southwest of the right abutment. The spillway has two adjacent sections. The right section is an uncontrolled concrete spillway with a 120 foot long weir section. Discharge is over a paved, sloped channel and under a highway crossing.

The left spillway section is utilized for lake water level regulation. Three vertical concrete walls form two gate chambers into which wooden stop logs can be placed to raise and lower the water level. The ungated overflow is at elevation 1,545'. The stop log chambers can be opened to approximately elevation 1,536'. A manwalk and overhead beam cross the chambers to aid in raising the stop logs.

Two 24 inch cast iron pipes are located through the embankment near the right abutment. The valves are located in a gate house at the downstream toe of the dam. The pipes are under constant pressure in the embankment.

b. Location: The dam is located in Allegany County near the Cattaraugus County line, north of Cuba, New York, along route 305. The location of the dam and lake can be found on the Cuba and Rawson , New York U.S.G.S. 7.5 minute series quadrangles (see site location map).

c. Size Classification: The dam is an intermediate size structure.

d. Hazard Classification: The Cuba Lake Dam is a high hazard potential structure.

e. Ownership: The dam is owned by the State of New York, Allegany State Park and Recreation Commission.

f. Purpose of Dam: The dam is presently used for recreation only. The dam was constructed as a feeder dam for the Genesee Canal.

g. Design and Construction History: No design data is available. Construction data is available only through interviews.

Reportedly the dam was constructed in the 1850's. The dam was modified in 1869 and 1872. Spillway revisions have been made.

h. Normal Operational Procedures: No maintenance is conducted on a regular basis.

The gated spillway level is lowered 7 feet during the winter. Spillway regulation is performed by a State Park Commisioner who resides at the lake.

1.3 Pertinent Data:

a. Drainage Area: The drainage area is 25.3 square miles. The drainage area is primarily wooded or used for agricultural purposes.

b. Discharge at Damsite:

Maximum known flood at damsite: Reported during Hurricane Agnes June, 1972. Approximate depth above spillway reported 5' (elevation 1,550').

Spillway capacity at maximum design pool elevation: Unknown design pool

Gated spillway capacity at pool elevation: 1,630 cfs (7' depth assumed)

Gated spillway capacity at maximum pool elevation: 1,630 cfs (gate openings only)
Ungated spillway capacity at maximum pool elevation: 54,190 cfs

Total spillway capacity at maximum pool elevation: 55,820 cfs

c. Elevation: (feet above MSL)

Top of Dam: 1,559.5

Maximum pool design surcharge: Unknown

Spillway crest: 1,545.0

Stream bed at centerline of dam: 1,505.0

Maximum tailwater: Unknown

Upstream invert drain pipes: Estimated 1,505

Downstream invert drain pipes: Estimated 1,505
(24" pipes)

d. Reservoir:

Length of Normal Pool: 9,000' (spillway to Oil Creek)

Length of Maximum Pool: 18,000'

e. Storage: (acre-feet)

Normal pool: 8,215 (from inventory)

Design surcharge: Unknown

Top of Dam: 16,498

f. Reservoir Surface: (acres)

Top of Dam: 677

Normal Pool: 465

g. Dam:

Type: Earthfill

Length: 1,750'

Height: 55'

Top Width: 8'

Side slopes: Upstream : 1.5:1
Downstream: 1.5:1 to 1.7:1

Zoning: Reportedly a clay puddle core dam

Impervious Core: Clay Puddle Core

Cutoff: Unknown

Grout Curtain: Unknown

h. Diversion and Regulating Tunnel: Drain Pipes

Type: Two 24" C.I. Pipes

Length: Approximately 220'

Closure: Manual valves in gatehouse

Access: Downstream toe of dam

Regulating Facilities: None

i. Spillway:

Type: Concrete broad-crested weir

Length: 102'

Crest Elevation: 1,545'

Gates: None

Upstream Channel: None

Downstream Channel: Concrete, sloping 100 feet to highway overpass.

j. Regulating Outlets: Adjacent to ungated spillway - stop log spillway

Type: Two chambers 11.75' and 12.75' wide

Height: Total depth 9' to el 1,536' operable to 1,538'

Control: Manual placement of 1' deep timber sections

SECTION 2: ENGINEERING DATA

2.1 Design: No design data was available for review except for a profile and plan on spillway repairs dated 1919.

2.2 Construction: No data was available on construction. It is reported that the dam was raised several times.

2.3 Operation: No operational plan is in use. Outlet pipes have not been operated in several years. Spillway gates are lowered approximately 7 feet in winter and then raised in June.

2.4 Evaluation: Little or no data is available to adequately evaluate the structure.

SECTION 3: VISUAL INSPECTION

3.1 Findings:

a. General: Cuba Lake Dam was inspected by L. Robert Kimball and Associates personnel and personnel from the state Parks and Recreation Commission.

b. Dam: The dam was heavily vegetated making visual inspection difficult.

Both the upstream and downstream slopes are relatively steep. The upstream slope is rip rapped. Some rolling, bulging and minor slumping and displacement was noted along the entire embankment.

Seepage was noted on the downstream slope 100' east of the gatehouse and 8 feet above the toe of the dam. Seepage was also noted higher on the embankment closer to the gatehouse approximatley 30 feet below the top of the dam. At both locations significant seepage was noted.

c. Appurtenant Structures: The gated (stop-log) spillway section is in relatively good condition. The uncontrolled overflow spillway section is in need of minor repairs to prevent further deterioration.

The control valves for the 24" C.I. drain pipes were in relatively poor condition. Seepage was noted below the left pipe. The right gate valve had a considerable leak.

d. Downstream Channel: Downstream of the dam the channel is fairly wide and wooded. Several homes and the intersection of three roads are located 1,300' downstream.

The channel downstream of the spillway is narrow at the highway crossing. The channel widens 1,000' downstream.

3.2 Evaluation: The visual inspection revealed some minor slumping and areas with high seepage on the downstream slope. The embankment slopes appeared relatively steep.

The heavy vegetation obscured both slopes making visual inspection difficult.

Deterioration of the upstream rip rap was noted.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures: The outlet works are not operated. The stop logs in the spillway are pulled in October to lower the lake level approximately 7 feet in winter. The logs are replaced in June.

4.2 Maintenance of Dam: No maintenance is performed.

4.3 Maintenance of Operating Facilities: No maintenance is performed on the outlet works. New stop logs are placed when needed on the spillway.

4.4 Description of Any Warning System is Effect: None

4.5 Evaluation: Little to no maintenance is performed on the dam or appurtenant structures. This lack of maintenance may eventually affect the safety of the structure.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Hydrologic Evaluation of Features:

a. Design Data: No design data was available on the emergency spillway. One page of check calculations for spillway capacity are available for what appears to be the old spillway.

b. Experience Records: The maximum flood noted at the dam was Hurricane Agnes in 1972. The water level rose to a reported 5 feet above normal pool (approximately 9.5 feet below the top of the dam.)

c. Visual Observations: At the time of the inspection approximately 0.1 foot of water was flowing over the stop log spillway section. The right side of the ungated spillway is slightly lower than the left as less than 0.1 foot of water was flowing over this section and none over the left section.
Some deterioration of the ungated spillway concrete was noted.

d. Overtopping Potential: Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and subsequent routing of the PMF through the reservoir system. The PMF is that hypothetical flow induced by the most critical combination of precipitation, minimal infiltration losses, and concentration of run-off at the specific location, that is considerered reasonably possible for a particular drainage area.

The drainage area contributing to the Cuba Lake Dam is approximately 25.3 square miles. To develop the basic hydrologic working tool, the unit hydrograph, Snyder Coefficients were used. Two parameters, the length of the main channel through the watershed and the length of the main channel relative to the watershed's center of gravity, were calculated from Cuba and Rawson Quadrangles. Using these two parameters, Snyder's lag in hours, Tp, was calculated.

A value of Tp = 6.53 was calculated for the watershed. Also, Snyder's peaking coefficient, Cp, was assumed to be 0.6 based discussions with Corps personnel.

Using Hydrometeorological Report No. 33, the PMP index rainfall was determined to be 22.5 inches for a 24 hour duration, 200 square mile basin. The percentages of the index rainfall applied to other durations were interpolated from the plot of drainage area verses percent of 24 hour, 200 square mile. The computed PMF peak flow was 26,000 CFS. Routing the PMF through the impounded storage reduced the peak flow by 2,000 CFS. A plot of PMF inflow and outflow hydrographs is included in the Appendix.

The ability of the Cuba Lake Dam to discharge the standard project flood (SPF) was also evaluated. The SPF peak flow of 11,000 CFS was routed through the reservoir. The SPF outflow is indicative of a pool elevation of 1551.7 feet above MSL. This allows for 7.8 feet of freeboard to the top of dam. While the spillway is overtopped by 6.7 feet. Water is also beginning to flow over the road adjacent to the spillway.

The PMF outflow is equivalent to 3.8 feet of freeboard remaining to the top of dam (the spillway is overtopped by 10.7 feet).

To allow inflow and outflow hydrographs to be developed and routed, several assumptions were made.

1. The bridge downstream from the spillway was considered to have no limiting effect on the spillway discharge capacity.

2. Flow over the road adjacent to the spillway was estimated and added to the spillway flow .

3. The gated spillway was assumed to have stop-logs in place to elevation 1545'.

SUMMARY OF HYDROLOGIC ANALYSIS
CUBA LAKE DAM

Elevation Top of Dam = 1559.5'
Elevation Crest of Spillway = 1545.0'

PMF ROUTING

PMF Peak = 26,000 CFS
PMF After Routing through Reservoir = 24,000 CFS
Elevation of Routed PMF corresponding to 24,000 CFS = 1555.7 feet above MSL
Freeboard remaining = 3.8 feet
Spillway Surcharge = 10.7 feet

SPF ROUTING

SPF Peak = 11,000 CFS
SPF After Routing through Reservoir = 8,000 CFS
Elevation of Routed SPF corresponding to 8,000 CFS = 1551.7 feet above MSL
Freeboard remaining = 7.8 feet
Spillway Surcharge = 6.7 feet

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability:

a. Visual Observations: Based on our visual inspection the embankment appeared to be in a meta-stable condition because of the steep slopes and high seepage level.

b. Design and Construction Data: No data is available

c. Operating Records: None available

d. Post-construction Changes: The dam has been raised in the past but no information was made available.

e. Seismic Stability: The dam is located in seismic zone 1 and should not present any problems unless static conditions are unfavorable.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment:

a. Safety: In view of the high seepage and steep slopes, if the water level should rise significantly the embankment may be in danger of failure. A water level rise of 10.7 feet during the PMF is possible.

b. Adequacy of Information: The information available is inadequate to completely assess the safety of the structure.

c. Urgency: The dam does not present an immediate danger, however, steps should be taken immediately to assess the structural stability and perform a seepage analysis. After this study, remedial measures should be promptly implemented.

d. Necessity for Future Studies: As outlined above a more detailed study should be conducted immediately. This work should include a drilling and testing program, monitor installation, stability and seepage analysis.

7.2 Recommendations:

1. The study outlined above should be promptly conducted and the conclusions of that study immediately implemented.

2. The vegetation should be thinned, all seepage areas located and weirs installed to record flows.

3. A routine, frequent inspection program should be implemented until future studies are completed and any necessary modifications performed. The inspections should be directed particularly at monitoring seepage and embankment stability. The dam should be inspected at least weekly with supplemental surveillance during precipitation events.

4. Potential seepage along the drain pipes should be investigated. The potential for gating the pipes upstream should be investigated to relieve pressure on the pipes within the embankment.

5. Total removal of root systems appears to be impractical as they are probably deep into the embankment and total removal may result in destruction of the embankment. Clearing of the embankment and surface roots, placement of a filter, drainage system and buttress appears to be the most practical solution. Results of future studies should dictate to what extent vegetation is removed and what remedial modifications are necessary.

APPENDIX A

GEOLOGY

Cuba Lake Dam

Cuba Reservoir is located in the Alleghany highlands which are a series of hills formed by the dissection of uplifted nearly horizontal layers of strata of Upper Devonian age. The bedrock in this area is composed chiefly of shales and siltstones of the Machais formation which is a part of the Canadaway Group.

Structurally this area has been mildly folded during the Alleghanian Orogeny. The axis of these folds are generally oriented to the east and are low in amplitude. Along the anticlines oil and gas is possible as indicated by an "oil spring" located south of the spillway.

During the Pleistocene Epoch, the valley in which the Cuba Reservoir is located was probably one of the major drainage routes for the retreating glacier. This is indicated by the apparent thick deposits of sediment in the steep sided wide valley. The occurance of several gravel deposits in the nearby Oil Creek valley also indicates that these were fluvial outwash from the glacier.

APPENDIX B

HYDROLOGIC COMPUTATIONS

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY JLT DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

DRAINAGE AREA

AREA = 25.34 SQ. MI.

LENGTH OF MAIN CHANNEL, L

10,500' THROUGH CUBA LAKE
41,000' THROUGH OIL CREEK
2,000'
53,500' ÷ 5,280 = 10.13 MI.

LENGTH LCA.

LCA = 10,500' THROUGH CUBA LAKE
13,500' THROUGH OIL CREEK
24,000' ÷ 5,280 = 4.55 MI.

PRECIPITATION

6 HOUR PMP INDEX = 22.5"

% OF DEPTH-AREA DURATION

6 HR - 101%
12 HR - 114%
24 HR - 124%
48 HR - 131%

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY _____ DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

SNYDER'S COEFFICIENTS

$$t_p = C_t(LL_{ca})^{0.3}$$
$$= 2.0((10.13)(4.55))^{0.3}$$
$$= 6.31$$

$$t_r = t_p/5.5$$
$$= 6.31/5.5$$
$$= 1.15$$

$$t_{pr} = t_p + .25(t_R - t_r)$$
$$= 6.31 + .25(2.0 - 1.15)$$
$$= 6.52$$

$$t_{pr} = C_t(.955)(LL_{ca})^{.3} + .25t_R$$
$$= 2.0(.955)[(10.13)(4.55)]^{.3} + .25(2.0)$$
$$= 6.53$$

SPS = 10" (1.14) = 11.4"

USE $C_t = 2.0$ BASED ON OTHER STUDIES IN AREA

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY JPI DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

ELEVATION - STORAGE RELATIONSHIP

ELEV	SURFACE AREA	Δ ELEV	STORAGE	DISCHARGE
FT	ACRES	FT	AC-FT	CFS
1545	465		0	0
		1.0		
1546	480		472	457
		1.0		
1547	494		960	1293
		1.0		
1548	509		1461	2394
		1.0		
1549	524		1978	3700
		1.0		
1550	539		2508	5192
		1.0		
1551	553		3054	6852
		1.0		
1552	567		3614	8769
		1.0		
1553	582		4188	11,309
		1.0		
1554	597		4778	14,697
		1.0		
1555	612		5382	19,065
		1.0		
1556	626		6002	24,552
		1.0		
1557	641		6635	31,314
		1.0		
1558	656		7284	39,380
		1.0		
1559	670		7946	48,817
		0.5		
1559.5	677		8283	54,190
		1.0		
1560.5	692		8968	70,899
		1.0		
1561.5	707		9667	93,405
		1.0		
1562.5	722		10,382	120,194
		1.0		
1563.5	736		11,111	150,913

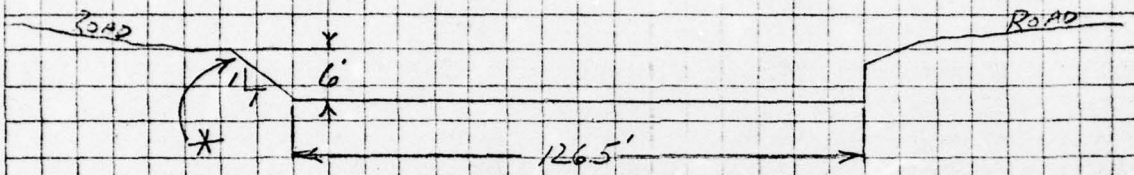
L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY JRT DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

SPILLWAY:

TOTAL WEIR LENGTH = 126.5'



$Q = CLH^{3/2}$

ASSUME $C = 3.6$

* CONSIDER AVERAGE CHANGE OF HEIGHT

ELEV.	HEAD	LENGTH	DISCHARGE	ELEV.	HEAD	LENGTH	DISCHARGE
1545	0	126.5	0	1556	11.0	129.5	17,008
1546	1.0	127	457	1557	12.0	129.5	19,380
1547	2.0	127.5	1298	1558	13.0	129.5	21,852
1548	3.0	128	2394	1559	14.0	129.5	24,421
1549	4.0	128.5	3700	1559.5	14.5	129.5	25,741
1550	5.0	129	5192	1560.5	15.5	129.5	28,449
1551	6.0	129.5	6852	1561.5	16.5	129.5	31,246
1552	7.0	129.5	8634	1562.5	17.5	129.5	34,129
1553	8.0	129.5	10,549	1563.5	18.5	129.5	37,096
1554	9.0	129.5	12,537	1564.5	19.5	129.5	40,144
1555	10.0	129.5	14,742				

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY JFI DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

ROAD OVERTOP:

$Q = CLH^{1.5}$

ASSUME $C = 2.8$

LENGTH MUST BE ESTIMATED FROM QUAD.

ELEV.	HEAD	LENGTH*	DISCHARGE
1551	0	0	0
1552	1.0	48	135
1553	2.0	96	760
1554	3.0	145	2110
1555	4.0	193	4323
1556	5.0	241	7544
1557	6.0	290	11,934
1558	7.0	338	17,528
1559	8.0	386	24,456
1559.5	8.5	410	28,449
1560.5	9.5	458	37,550
1561.5	10.5	507	48,300
1562.5	11.5	555	60,604
1563.5	12.5	603	74,617
1564.5	13.5	651	90,415

* ESTIMATED AVERAGE LENGTH

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY _____ DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

DAM OVERTOP: $Q = CLH^{1.5}$
$C = 2.8$, $L = 1750'$

ELEV	HEAD	LENGTH	DISCHARGE
1559.5	0	1750	0
1560.5	1.0	1750	4900
1561.5	2.0	1750	13,859
1562.5	3.0	1750	25,461
1563.5	4.0	1750	39,200
1564.5	5.0	1750	54,784

L. ROBERT KIMBALL
Consulting Engineers

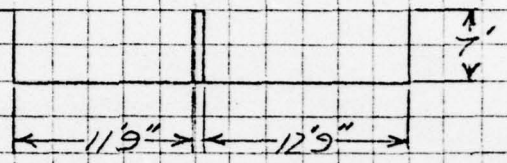
SUBJECT _____ BY _____ DATE _____

SHEET NO _____ OF _____

JOB NO. _____

CUBA LAKE DAM

GATED SPILLWAY CAPACITY:



$Q = C L H^{3/2}$ USE $C = 3.6$

ELEV.	H	Q
1538	0	0
1545	7	1630

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY _____ DATE _____
SHEET NO _____ OF _____
JOB NO. _____

CUBA LAKE

ELEVATION - DISCHARGE RELATIONSHIP

ELEV. FT.	SPILLWAY Q	ROAD OVERTOP Q	DAM OVERTOP Q	TOTAL DISCHARGE Q
1545	0	—	—	0
1546	457	—	—	457
1547	1298	—	—	1298
1548	2394	—	—	2394
1549	3700	—	—	3700
1550	5192	—	—	5192
1551	6852	0	—	6852
1552	8634	135	—	8769
1553	10,549	760	—	11,309
1554	12,587	2110	—	14,697
1555	14,742	4323	—	19,065
1556	17,008	7544	—	24,552
1557	19,380	11,934	—	31,314
1558	21,852	17,528	—	39,380
1559	24,421	24,456	—	48,817
1559.5	25,741	28,449	0	54,190
1560.5	28,449	37,550	4900	70,899
1561.5	31,246	48,300	13,859	93,405
1562.5	34,129	60,604	25,461	120,194
1563.5	37,096	74,617	39,200	150,913
1564.5	40,144	90,415	54,784	185,343

L. ROBERT KIMBALL
Consulting Engineers

SUBJECT _____ BY _____ DATE _____
SHEET NO _____ OF _____
JOB NO. _____

```
**********
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
**********
                    CUCA LAKE DAM - NEW YORK
                    RESERVOIR AT TOP OF FLOOD POOL
                    TEST DWF

                                JOB SPECIFICATION
                      NO    NAR  NMIN  IDAY   IHR  IMIN METRC  IPLT  IPRT ISTAN
                      55      2     0     0     0     0     0     0     0     0
                                                JOPER   NCOM
                                                    5      0

**********          **********          **********          **********          **********

                                SUB-AREA RUNOFF COMPUTATION
                          ISTAO   ICOMP   IECON   ITAPE   JPLT    JPRT    INAME
                              1       0       0       0       0       0       3

                                HYDROGRAPH DATA
                    IHYDG   IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO  ISAME   LOCAL
                        1      1   25.34     0.0   25.34     0.0     0.0      0       0

                                PRECIP DATA
                          SPFE     PMS      R6      R12     R24     R48     R72     R96
                           0.0   22.50  101.00  114.00  124.00  131.00     0.0     0.0
TRSPC COMPUTED BY THE PROGRAM IS 0.850

                                LOSS DATA
                    STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOR   STRTL   CNSTL   ALSMX   RTIMP
                      0.0     0.0    1.00     0.0     0.0    1.00    1.50    0.10     0.0     0.0

                                UNIT HYDROGRAPH DATA
                          TP   6.55    CP 0.60    NTA   0

                                RECESSION DATA
                          STRTQ   25.00    QRCSN   -0.35    RTIOR  3.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE IC  3.85 AND R  3.17 INTERVALS

                UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES, LAG   6.55 HOURS, CP  0.60  VOL  1.00
              208.    740.   1280.   1456.   1293.    889.    647.    471.    343.    249.
              181.    132.     96.     70.     51.     37.     27.     20.     14.

                                END-OF-PERIOD FLOW
                          TIME   RAIN   EXCS   COMP Q
```

51	0.0	0.0	671.	
52	0.0	0.0	671.	
53	0.0	0.0	538.	
54	0.0	0.0	403.	
55	0.0	0.0	403.	
SUM	24.46	20.72	223722.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	20258.	24363.	13877.	8671.	223722.
INCHES		8.95	20.38	20.77	27.01
AC-FT		12097.	27936.	36104.	365308.

OVF

STATION 1

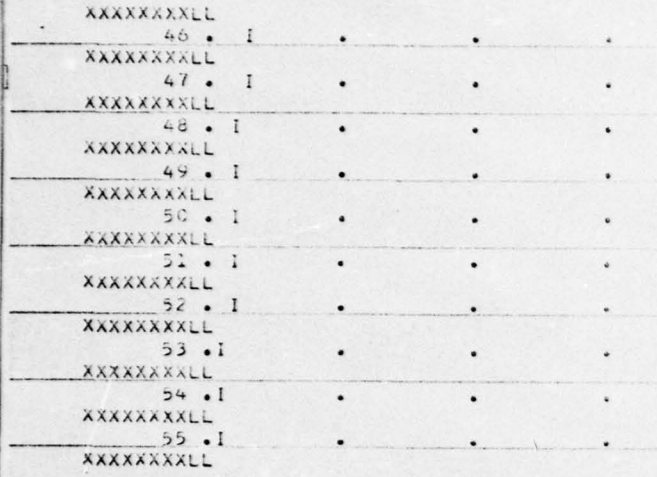
INFLOW I , OUTFLOW O, AND OBSERVED FLOW *

0. 4000. 8000. 12000. 16000. 20000. 24000. 28000. 0. 0. 0. 0.

* 0.

PRECIP L AND EXC

ESS X
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 12. 0. 0.
ESS X 0.
1 I
ESS X 0.L
2 I
ESS X 0.L
3 I
ESS X 0.L
4 I
ESS X 0.L
5 I
ESS X 0.L
6 I
ESS X 0.L
7 I
ESS X OLX
8 I
ESS X OLX
9 I
ESS X OLX
10 I
ESS X OLL
11 I
ESS X OLL
12 I
ESS X OLL
13 I
ESS X OLX
14 I
ESS X OLX
15 I
ESS X OLX
16 .I
ESS X LXX
17 . I
ESS X LXX
18 . I
ESS X LXX
19 . I
XXXXXXXXXX
20 . I


XXXXXXXXLL
46 . I . . . . .
XXXXXXXXLL
47 . I . . . . .
XXXXXXXXLL
48 . I . . . . .
XXXXXXXXLL
49 . I . . . . .
XXXXXXXXLL
50 . I . . . . .
XXXXXXXXLL
51 . I . . . . .
XXXXXXXXLL
52 . I . . . . .
XXXXXXXXLL
53 .I . . . . .
XXXXXXXXLL
54 .I . . . . .
XXXXXXXXLL
55 .I . . . . .
XXXXXXXXLL

OVN

HYDROGRAPH ROUTING

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
2	1	0	0	0	0	0

ROUTING DATA

WLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	0.	950.	1978.	3054.	4188.	9304.	6079.	7249.	8283.	9304.	
OUTFLOW	0.	1298.	3750.	6852.	11304.	19059.	31514.	46317.	64290.	70870.	

TIME	LCU STOR	AVAILTY	END OUT
1	14.	14.	14.
2	14.	14.	14.
3	14.	14.	14.
4	14.	14.	14.
5	14.	14.	14.
6	14.	14.	14.
7	14.	14.	14.
8	14.	14.	14.
9	14.	14.	14.
10	14.	14.	14.
11	14.	14.	14.
12	14.	14.	14.
13	14.	14.	14.
14	14.	14.	14.
15	14.	14.	14.
16	14.	14.	14.
17	14.	14.	14.
18	14.	14.	14.
19	14.	14.	14.
20	1291.	1291.	1291.
21	2584.	2584.	2584.
22	4430.	4430.	4430.
23	5920.	5920.	5920.
24	5921.	5921.	5921.
25	5921.	5921.	5921.
26	5921.	5921.	5921.
27	5921.	5921.	5921.
28	5921.	5921.	5921.
29	5921.	5921.	5921.
30	5921.	5921.	5921.
31	5921.	5921.	5921.
32	5921.	5921.	5921.
33	5921.	5921.	5921.
34	5921.	5921.	5921.
35	5921.	5921.	5921.
36	5921.	5921.	5921.
37	5921.	5921.	5921.
38	5921.	5921.	5921.
39	5921.	5921.	5921.
40	5921.	5921.	5921.
41	5921.	5921.	5921.
42	5921.	5921.	5921.
43	5921.	5921.	5921.
44	5921.	5921.	5921.
45	5921.	5921.	5921.
46	5921.	5921.	5921.
47	5921.	5921.	5921.
48	5921.	5921.	5921.
49	5921.	5921.	5921.

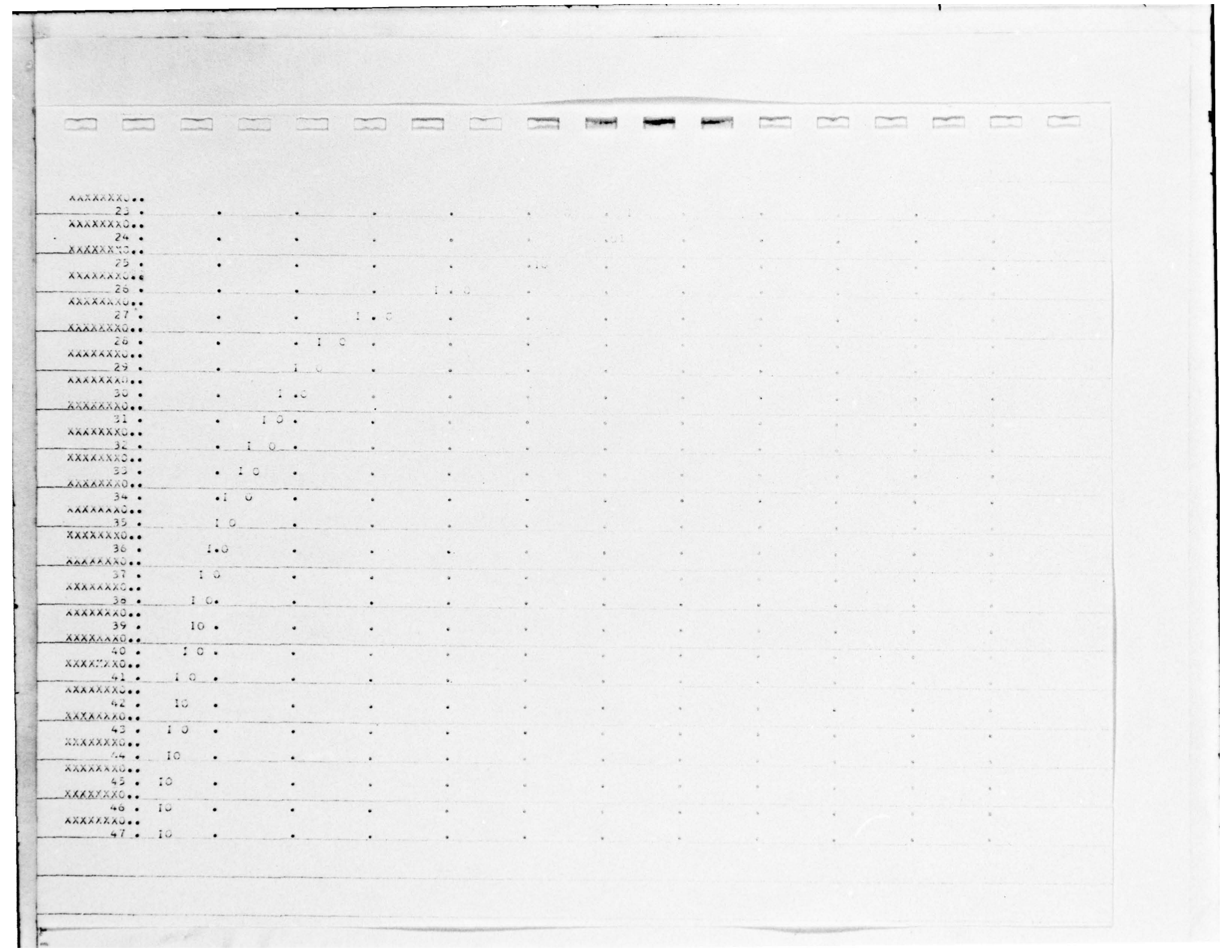
50	624.	714.	2416.	
51	714.	1.	1049.	
52	712.	638.	954.	
53	853.	878.	903.	
54	556.	911.	1096.	
55	546.	428.	1104.	
SUM			21714.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	24334.	22976.	13173.	6566.	21714.
INCHES		0.21	1.20	2.99	3.00
AC-FT		11161.	64053.	32758.	105564.

OVF

STATION 2

INFLOW I , OUTFLOW O , AND OBSERVED FLOW X



```
XXXXXXX0..
      48 . IO    .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      49 . IO    .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      50 . IO    .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      51 . IO    .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      52 . I     .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      53 .IO     .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      54 .IO     .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
      55 .IO     .     .     .     .     .     .     .     .     .     .     .
XXXXXXX0..
```

RUNOFF SUMMARY* AVERAGE FLOW

		PEAK				AREA
HYDROGRAPH AT	1	26236.	24263.	13677.	6018.	29.54
ROUTED TO	2	24334.	22370.	13677.	6018.	29.54

```
**********
HEC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHANGE NO. 01
**********
                    CUBA LAKE DAM - NEW YORK
                    RESERVOIR AT TOP OF FLOOD POOL
                    TEST SPF

                                JOB SPECIFICATION
                      NQ   NHR  NMIN  IDAY   IHR  IMIN METRC  IAUT  IPRT NSTAN
                      55     2     0     0     0     0     0     2     0     0
                                      JOPER     NRT
                                          3       0

**********          **********          **********          **********          **********

                            SUB-AREA RUNOFF COMPUTATION
                      ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT    INAME
                          1       0       0       5       0       0

                                HYDROGRAPH DATA
                IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                    1       1   25.34     0.0   25.34     0.0     0.0       0       0       0

                                  PRECIP DATA
                        SPFE     PMS      R6      R12     R24     R48     R72     R96
                       11.40     0.0     0.0     0.0     0.0     0.0     0.0     0.0
TRSPC COMPUTED BY THE PROGRAM IS 0.830

                                   LOSS DATA
              STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOS   STRTL   CNSTL   ALSMX   RTIMP
                0.0     0.0    1.00     0.0     0.0    1.00    1.00    0.10     0.0     0.0

                              UNIT HYDROGRAPH DATA
                            TP  6.59   CP 0.60    NTA   0

                                RECESSION DATA
                          STRTQ    25.00    QRCSN   -0.39    RTIOR  3.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC  3.85 AND R  3.27 INTERVALS

          UNIT HYDROGRAPH 19 END-OF-PERIOD ORDINATES. LAG    6.59 HOURS. CP  0.60  VOL  1.00
      208.     740.    1280.    1456.    1225.     889.     647.     471.     343.     249.
      181.     132.      96.      70.      51.      37.      27.      20.      14.

                              END-OF-PERIOD FLOW
                          TIME   RAIN   EXCS    COMP Q
```

1	0.01	0.00	22.
2	0.01	0.00	20.
3	0.01	0.00	18.
4	0.01	0.00	16.
5	0.01	0.00	14.
6	0.01	0.00	13.
7	0.06	0.00	12.
8	0.15	0.00	10.
9	0.05	0.00	9.
10	0.01	0.00	8.
11	0.01	0.00	7.
12	0.01	0.00	7.
13	0.02	0.00	6.
14	0.02	0.00	5.
15	0.02	0.00	5.
16	0.06	0.00	4.
17	0.06	0.00	4.
18	0.06	0.00	3.
19	0.28	0.00	3.
20	0.58	0.00	3.
21	0.23	0.02	7.
22	0.04	0.00	20.
23	0.04	0.00	32.
24	0.04	0.00	36.
25	0.17	0.00	30.
26	0.17	0.00	22.
27	0.17	0.00	16.
28	0.47	0.27	69.
29	0.47	0.27	268.
30	0.47	0.27	615.
31	2.11	1.91	1352.
32	4.31	4.11	3367.
33	1.71	1.51	6781.
34	0.29	0.09	9433.
35	0.29	0.09	10882.
36	0.29	0.09	9614.
37	0.01	0.00	7322.
38	0.01	0.00	5460.
39	0.01	0.00	4033.
40	0.02	0.00	3094.
41	0.02	0.00	3131.
42	0.02	0.00	2805.
43	0.11	0.00	2513.
44	0.42	0.02	2294.
45	0.09	0.00	2117.
46	0.01	0.00	1808.
47	0.01	0.00	1620.
48	0.01	0.00	1451.
49	0.0	0.0	1400.
50	0.0	0.0	1155.

51	0.0	0.0	1044.	
52	0.0	0.0	931.	
53	0.0	0.0	830.	
54	0.0	0.0	751.	
55	0.0	0.0	677.	
SUM	13.24	8.69	87744.	

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10862.	10110.	5770.	2432.	87749.
INCHES		3.71	8.44	10.71	10.74
AC-FT		5016.	11490.	14480.	14511.

OVF

STATION 1

INFLOW I , OUTFLOW O AND OBSERVED FLOW *

0. 2000. 4000. 6000. 8000. 10000. 12000.

* 0.

ESS X 0.

0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

ESS X 0.

1 I

ESS X 0.L

2 I

ESS X 0.L

3 I

ESS X 0.L

4 I

ESS X 0.L

5 I

ESS X 0.L

6 I

ESS X 0.L

7 I

ESS X 0.L

8 I

ESS X OLX

9 I

ESS X OLL

10 I

ESS X OLL

11 I

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12 I

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13 I

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14 I

ESS X OLL

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ESS X OLL

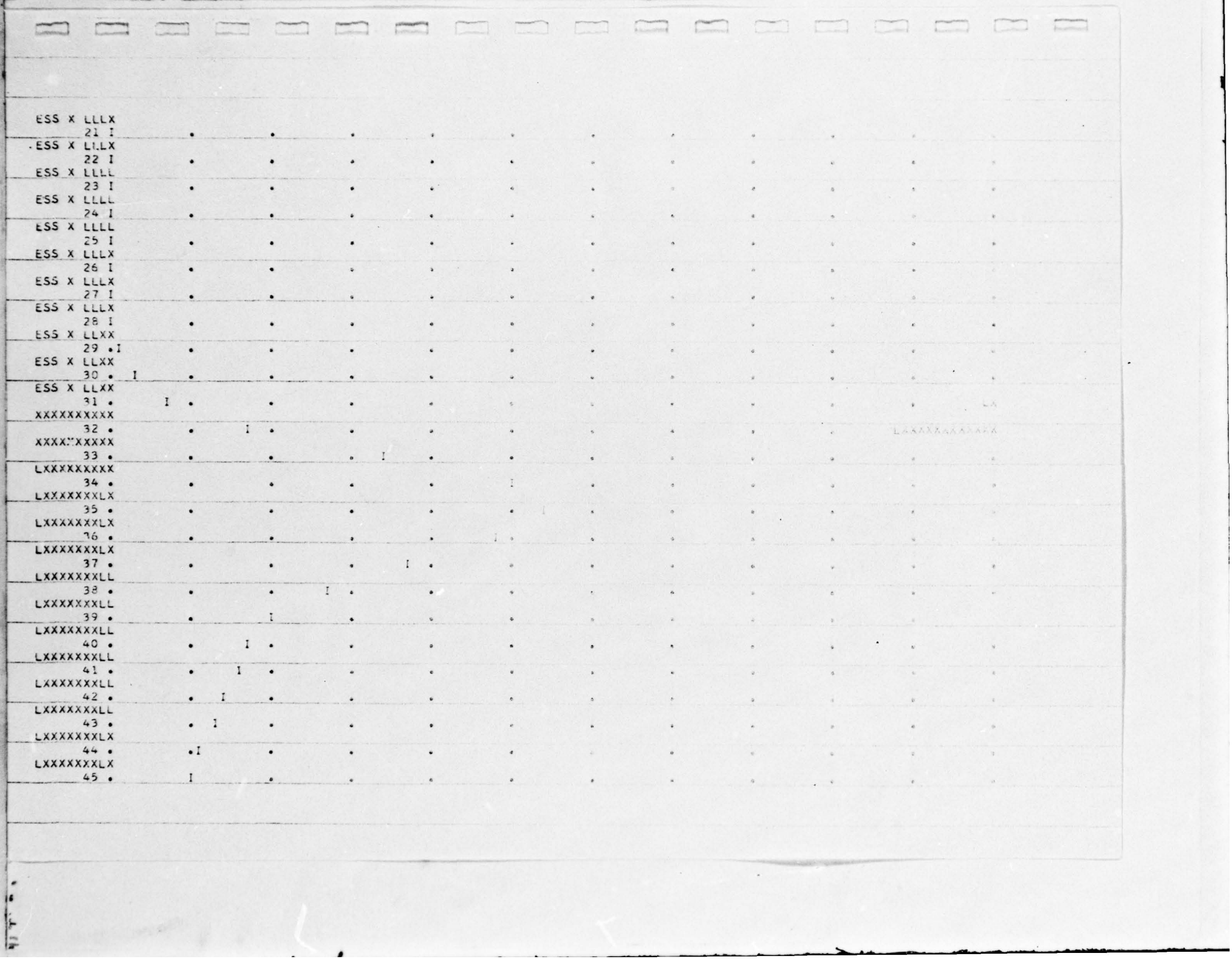
18 I

ESS X OLL

19 I

ESS X OLX

20 I


ESS X LLLX
21 I
ESS X LLLX
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ESS X LLLL
23 I
ESS X LLLL
24 I
ESS X LLLL
25 I
ESS X LLLX
26 I
ESS X LLLX
27 I
ESS X LLLX
28 I
ESS X LLXX
29 •I
ESS X LLXX
30 • I
ESS X LLXX
31 • I
XXXXXXXXXX
32 •
XXXXXXXXXX
33 •
LXXXXXXXXX
34 •
LXXXXXXXLX
35 •
LXXXXXXXLX
36 •
LXXXXXXXLX
37 •
LXXXXXXXLL
38 •
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39 •
LXXXXXXXLL
40 •
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LXXXXXXXLL
42 •
LXXXXXXXLL
43 •
LXXXXXXXLX
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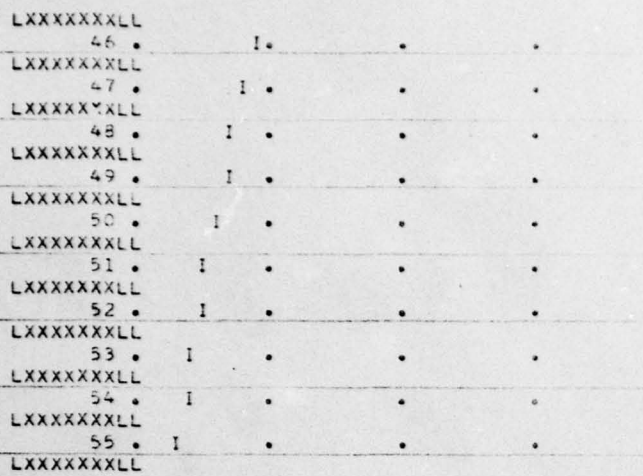
LXXXXXXXLX
45 •


LXXXXXXXLL
46 .
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50 .
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LXXXXXXXLL
54 .
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LXXXXXXXLL
55 .
I .
LXXXXXXXLL

OVN

********** ********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
2	1	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.0	0.0	0.0	1	0

NSTPS	NSTDL	LAG	AMSAK	X	TSK	STORA
1	0	0	0.0	0.0	0.0	-1.

STORAGE	0.	960.	1978.	3054.	4188.	5382.	6935.	7946.	8283.	8968.
OUTFLOW	0.	1298.	3700.	6852.	11309.	19055.	31814.	48817.	54190.	70899.

TIME	EOP STOR	AVG IN	EOP OUT
1	17.	22.	22.
2	16.	21.	22.
3	16.	19.	22.
4	15.	17.	21.
5	14.	15.	20.
6	14.	14.	18.
7	13.	12.	17.
8	12.	11.	16.
9	11.	10.	15.
10	10.	9.	14.
11	9.	8.	13.
12	8.	7.	11.
13	8.	6.	10.
14	7.	6.	9.
15	6.	5.	8.
16	6.	5.	8.
17	5.	4.	7.
18	5.	4.	6.
19	4.	3.	6.
20	4.	3.	5.
21	4.	5.	5.
22	5.	15.	7.
23	8.	26.	11.
24	11.	34.	15.
25	14.	38.	19.
26	15.	46.	23.
27	15.	49.	24.
28	18.	43.	25.
29	40.	168.	54.
30	97.	441.	132.

31	224.	984.	303.
32	529.	2354.	715.
33	1161.	5069.	1773.
34	2068.	8357.	3965.
35	2926.	10407.	6476.
36	3398.	10198.	8204.
37	3425.	8423.	8311.
38	3186.	6396.	7372.
39	2846.	4747.	6242.
40	2516.	3764.	5276.
41	2255.	3313.	4511.
42	2049.	2968.	3909.
43	1879.	2659.	3467.
44	1729.	2382.	3113.
45	1594.	2135.	2794.
46	1472.	1913.	2506.
47	1362.	1714.	2247.
48	1264.	1535.	2015.
49	1175.	1376.	1806.
50	1096.	1232.	1619.
51	1025.	1104.	1451.
52	961.	989.	1300.
53	900.	886.	1216.
54	837.	794.	1131.
55	774.	712.	1047.
SUM			83348.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8311.	7963.	5303.	2308.	83348.
INCHES		2.92	7.79	10.17	10.20
AC-FT		3950.	10524.	13740.	13784.

OVF

STATION 2

INFLOW I , OUTFLOW O AND OBSERVED FLOW *

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      0.    2000.    4000.    6000.    8000.   10000.   12000.      0.      0.      0.      0.      0.
LXXXXXX0.
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LXXXXXX0..
     2 I     .        .        .        .        .        .        .       .       .       .       .
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     3 I     .        .        .        .        .        .        .       .       .       .       .
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     9 I     .        .        .        .        .        .        .       .       .       .       .
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    19 I     .        .        .        .        .        .        .       .       .       .       .
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LXXXXXX0..
    21 I     .        .        .        .        .        .        .       .       .       .       .
LXXXXXX0..
    22 I     .        .        .        .        .        .        .       .       .       .       .
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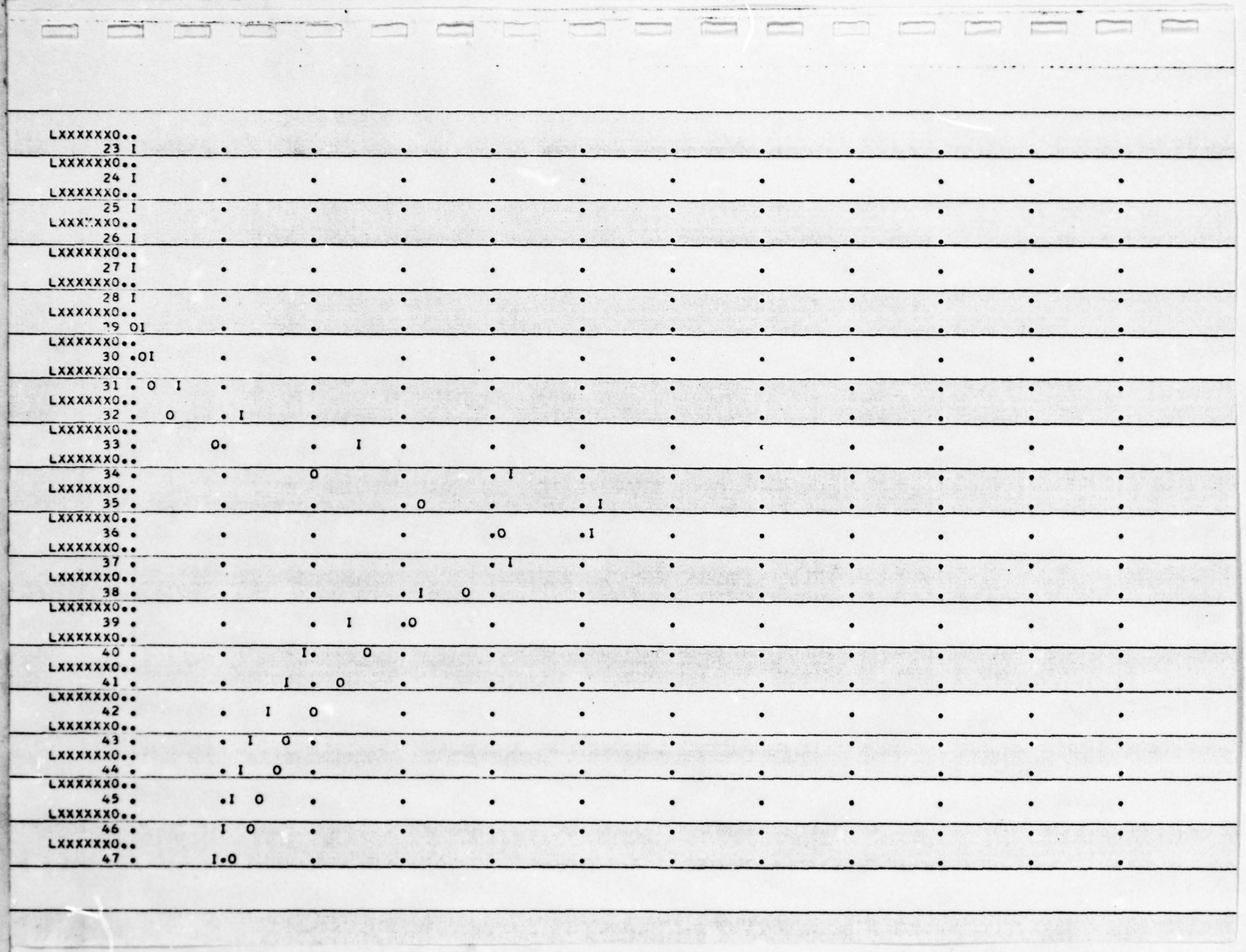

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LXXXXXX0..
      48 .     I O     .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      49 .     I O.    .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      50 .     I O .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      51 .     IO  .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      52 .    I O  .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      53 .   I O   .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      54 .   I O   .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
      55 .   IO    .   .   .   .   .   .   .   .   .   .   .   .
LXXXXXX0..
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RUNOFF SUMMARY, AVERAGE FLOW

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	1	10882.	10110.	5770.	2432.	25.34
ROUTED TO	2	8311.	7963.	5303.	2308.	25.34

APPENDIX C

PHOTOGRAPHS

Photograph Index

1. View of upstream face from right abutment.
2. View of upstream face from left abutment.
3. Upstream face showing steep slope, displaced rip rap, and movement (noted by trees).
4. Upstream slope showing rip rap, washed out areas, and gabions.
5. Downstream slope from cemetery (downstream) showing tree growth, small retaining wall at toe near cemetery.
6. View of emergency uncontrolled spillway and gated spillway in foreground.
7. Downstream view of gated spillway.
8. Downstream channel showing highway bridge.

PLATE 1

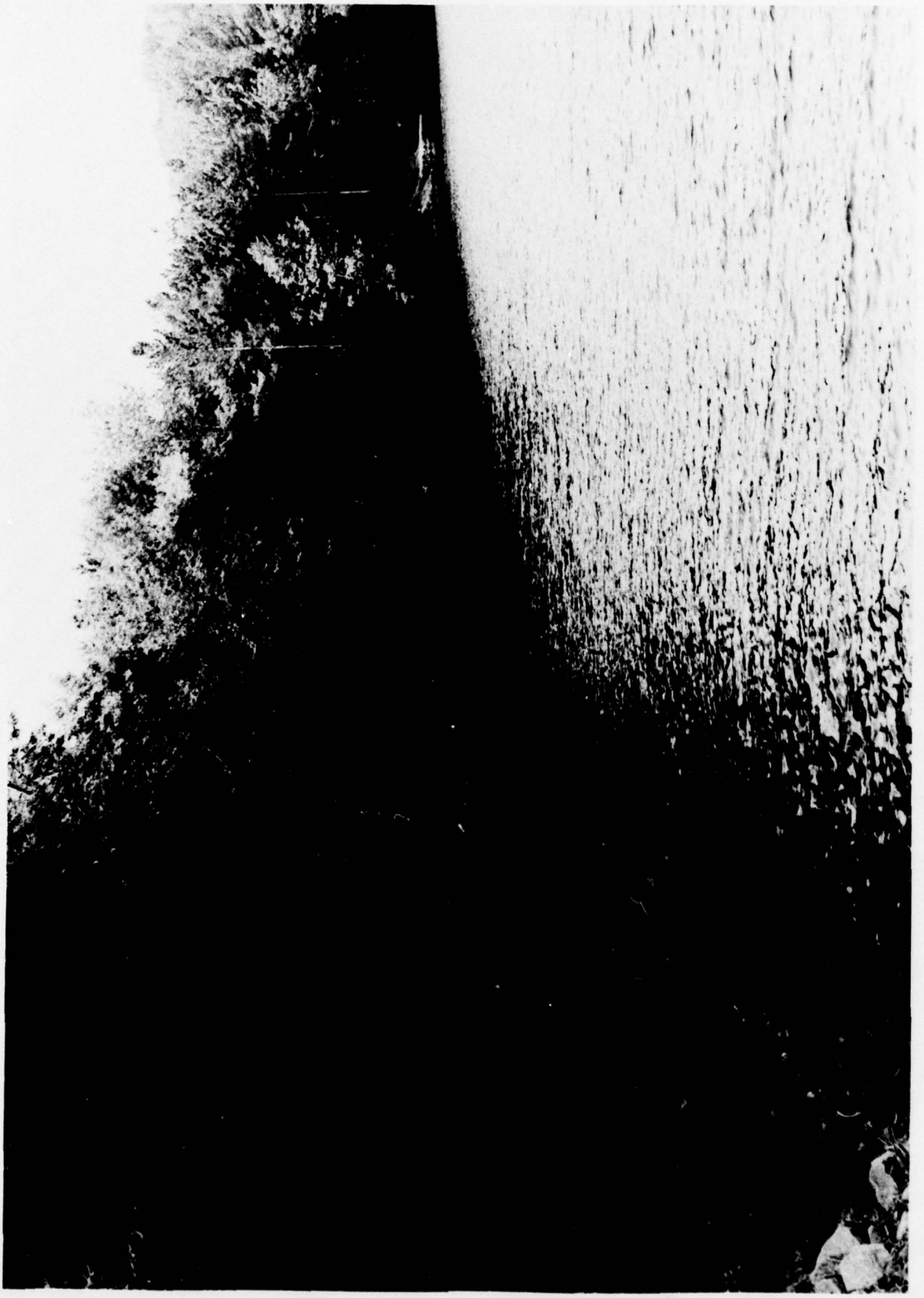


PLATE 2

PLATE 3

PLATE 4

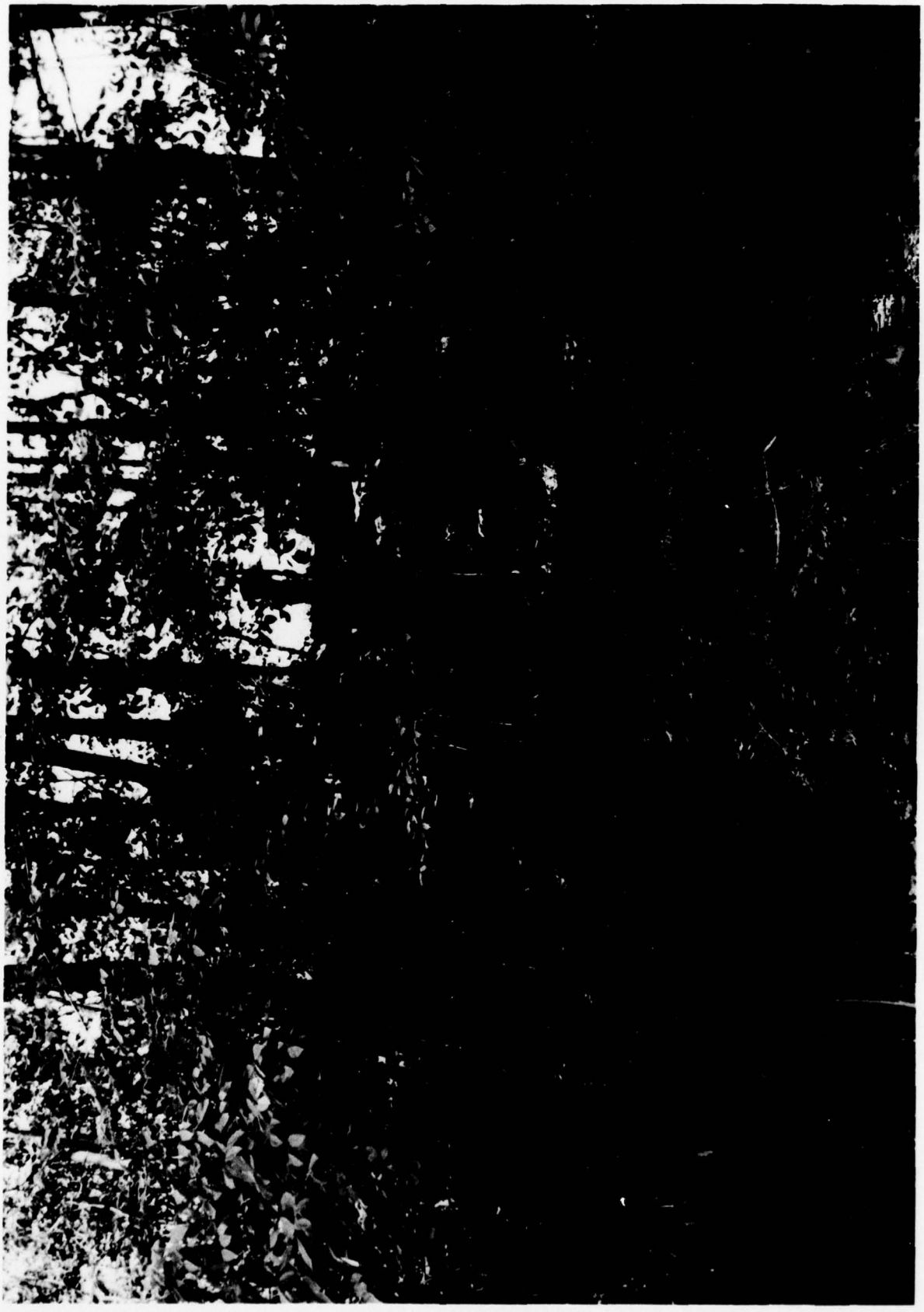


PLATE 5

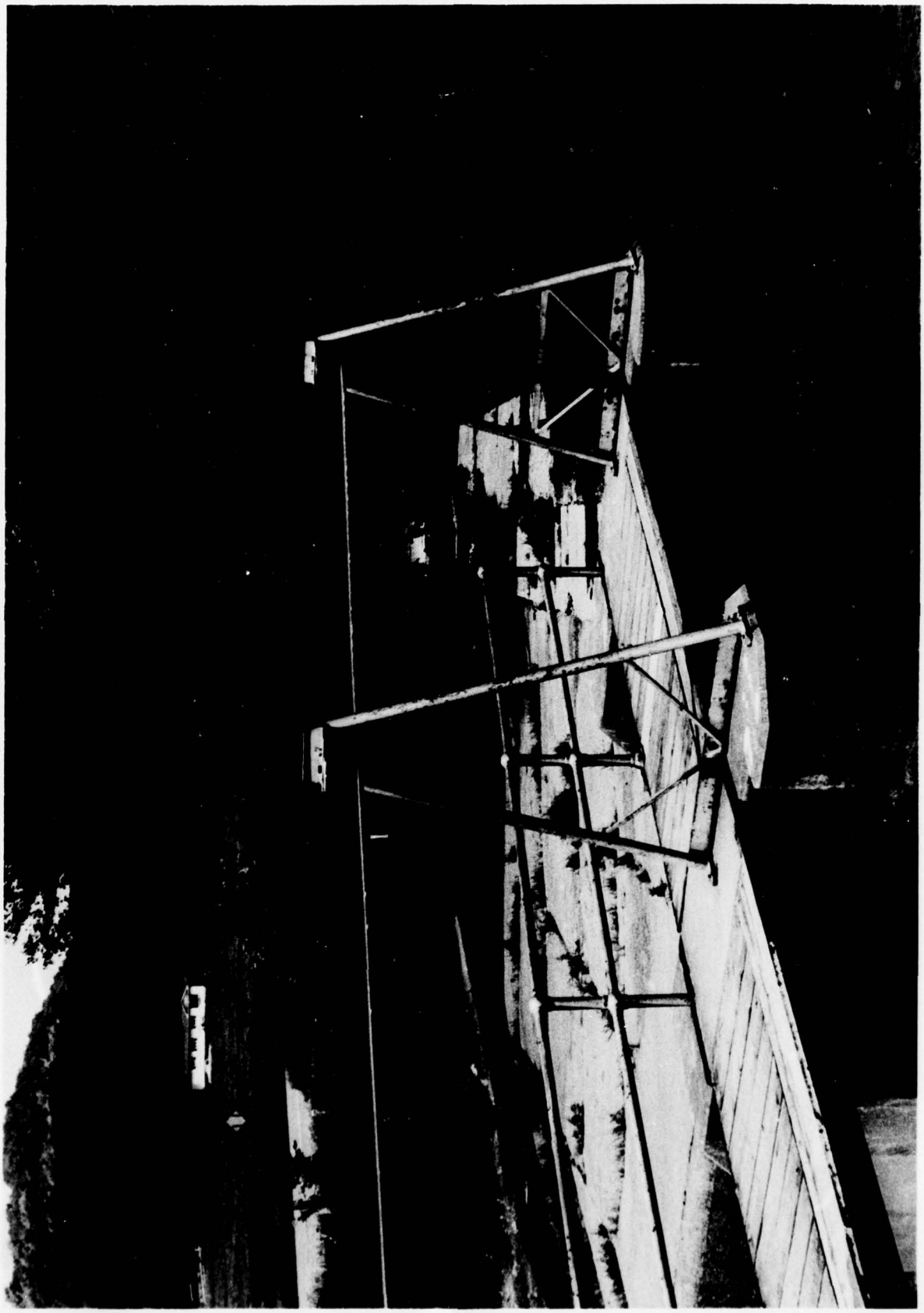


PLATE 6

PLATE 7

PLATE 8

APPENDIX D

PERTINENT CORRESPONDENCE AND REPORTS

Cuba Lake

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Peter A. A. Berle
Commissioner

June 24, 1977

Mr. Charles H. Jennings
Director of Division of
Land Utilization
Office of General Services
Tower Building
Empire State Plaza
Albany, NY 12242

RE: Dam #371, Cuba Lake
Allegheny Basin

Dear Mr. Jennings:

Reference is made to your letter of May 31, 1977 to Mr. Victor Glider in which you requested an inspection report for the Cuba Lake dam.

On June 17, 1977, I met with Messrs. Peter Sprague, Norman Ungerman, A. J. Tuttle, Bernard E. Stout, and Ralph E. Lunn of the Cuba Lake Cottage Owners' Association at Mr. Sprague's office in Cuba, NY. I was informed of the history of the dam and then inspected the outlet valve house and the dam spillway with members of the Cottage Owners' Association. The previous afternoon of June 16, 1977 I had inspected the earth embankment of the dam. Following is a summary of the maintenance that is necessary for this structure.

EARTH EMBANKMENT

The earth embankment suffers from a lack of maintenance over a long period of time. A heavy growth of trees and brush exists on the upstream and downstream slopes of the dam. The trees and brush should be cut and removed above the water surface on the upstream and downstream slopes.

The earth dam, 55 feet high and 1750 feet long, appears to be in good condition. The upstream and downstream slopes are steeper than normal for an earth embankment. The top width of the dam is only about 8 feet. However, since the normal water surface is about 15 feet below the top of the dam, the earth cross section is quite large at this low elevation.

The large number of trees and brush on the dowstream slope makes it difficult to detect any seepage through the dam. In the area that I inspected, no seepage was evident on the embankment or toe of dam.

DRAIN PIPES

Two 24-inch diameter cast iron pipe drains are located about 50 feet below the top of dam. The purpose of these pipes is to drain the lake if required. The pipes are controlled by a hand operated valve located in the valve house on the downstream toe of dam. The pipes were put in when the dam was built in 1850, therefore, they are over 100 years old. A portion of the pipes can be seen at the valve house. At this location the pipes have a wall thickness over one-inch thick.

The dam pipes have not been used in a great many years. Normal operating procedure calls for lowering the lake about four feet in the fall by removing the stop-logs adjacent to the spillway. Several years ago local youths succeeded in opening one of the pipes; the pipe was closed again, but there is some leakage through the valve packing.

The undesirable feature of having the control valve on the downstream end of the pipe is that the 200 foot long pipe is constantly under about 40 feet of head. Any openings caused by corrosion of the pipe can result in the removal of embankment soil in the vicinity of the pipe and failure of the dam. The exposed pipe in the valve house appears to be in good condition. However, we do not know the condition of the pipe that has been buried in the dam for over 100 years. I recommend that the lake be drained after the summer recreational season is over. The drain pipes should then be inspected, and the control for the drain should then be changed to the upstream end of the pipe. A control valve should be installed at the inlet end of the drain. The drain can then be controlled by a sluice gate or hydraulic valve with the gate stem placed along the upstream slope of the dam. Although this drain is not used very often, this structure should not be permanently sealed since the drain will permit the reservoir to be lowered in the event that the earth embankment requires repair.

The iron beam that supports the outlet valve in the valve house has corroded and no longer provides any support. A new temporary support should be provided by placing a steel beam along the masonry floor of the valve house and suporting the existing valve with a large U-bolt or chain attachment to the steel beam.

SPILLWAY

The spillway for the dam is located on the west side of the lake about two miles from the earth embankment. This structure appears to be functioning properly. I was informed by members of the Cottage Owners' Association that flood flows occurred in 1967 and during Hurricane Agnes in June 1972. The spillway had sufficient capacity to adequately discharge the flows from these storms.

The spillway consists of a broad crested uncontrolled stone masonry weir about 90 feet long and two concrete sluiceways, each about 6 feet wide and 8 feet deep. During the fall, the water surface of the lake is lowered about 4 feet by removing the stop-logs across the sluiceways. Steel sheet piling has been driven along the upstream face of the weir spillway. Siltation has filled in the spillway approach channel so that it is not possible to lower the water surface more than four feet by removing the stop-logs.

During the summer, the water surface of the lake is maintained at the crest of the weir with all stop-logs in place. The elevation of the weir is about 15 feet below the top of the earth dam.

The concrete wall adajcent to the east side of the spillway is about 3 feet high. On the west side of the spillway the crest of the spillway ties into the surrounding earth.

I recommend that the following maintenance be performed on the spillway:

On the west side of the stone masonry weir portions of the stone have been removed along the crest of the spillway. These areas should be filled in with concrete. In order to prevent any future erosion of the earth, a concrete wall should be built on the west side of the wier spillway similar to the wall on the east side.

ANNUAL MAINTENANCE

Annual maintenance will involve the cutting and removal of new growth of brush and trees along the upstream and downstream slopes of the earth embankment. Performing this work will enable the caretaker to observe the condition of the earth embankment. Any seepage through the dam can be detected before a serious problem occurs.

Periodic maintenance should also include inspection of the concrete, masonry and stop-logs in the spillway. The valves for the drain pipe should be operated occasionally to insure that they will function properly.

Yours truly,

George Koch
Supervisor, Dam Safety Section

(Rev. 3/77)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
77 + 365	Allegany	Cuba	Allegany	C	6/22/77 K.P.

Stream = Cuba Lk Owner = State

Type of Construction

- [x] Earth w/Concrete Spillway
- [ ] Earth w/Drop Inlet Pipe
- [ ] Earth w/Stone or Riprap Spillway
- [ ] Concrete
- [ ] Stone
- [ ] Timber
- [ ] Other _____

Use

- [ ] Water Supply -?
- [ ] Power
- [x] Recreation - [x] High Density
- [ ] Fish and Wildlife
- [ ] Farm Pond
- [ ] No Apparent Use-Abandoned
- [ ] Flood Control
- [ ] Other _____

Estimated Impoundment Size 8215.2F Acres ~~###~~ Estimated Height of Dam above Streambed 55 Ft.

Condition of Spillway

- [x] Service satisfactory
- [ ] In need of repair or maintenance
- [x] Auxiliary satisfactory
- [ ] In need of repair or maintenance

Explain: _____

Condition of Non-Overflow Section

- [ ] Satisfactory
- [x] In need of repair or maintenance

Explain: Trees + Brush

Condition of Mechanical Equipment

- [x] Satisfactory (±)
- [ ] In need of repair or maintenance

Explain: _____

Siltation [ ] High [x] Low

Explain: _____

Remarks: _____

Evaluation (From Visual Inspection)

- [ ] Repairs req'd. beyond normal maint.
- [x] No defects observed beyond normal maint.

DEPARTMENT OF THE ARMY
PITTSBURGH DISTRICT, CORPS OF ENGINEERS
FEDERAL BUILDING, 1000 LIBERTY AVENUE
PITTSBURGH, PENNSYLVANIA 15222

ORPED-FS

17 January 1977

Mr. A. J. Tuttle
Chairman, Cuba Lake
Cottage Owners' Association
Route #1
Cuba, NY 14727

Dear Mr. Tuttle:

Inspection of Cuba Lake Dam

In response to a letter from Mr. Norman Ungermann, also of the Cuba Lake Cottage Owners' Association, a member of my staff met with you, Mr. Ungermann, and others of the Association and of the Allegany State Park Commission on 14 December 1976. He conducted a brief visual reconnaissance inspection for the purpose of advising you on the apparent general condition of the structure and on the need for a more thorough evaluation by an engineering consultant. His tentative conclusions were discussed with you after the inspection, and a copy of his report is included with this letter.

Many firms of consulting engineers specialize in this type of work and will be capable of conducting the in-depth evaluation recommended. It is suggested that you contact the New York State authorities for a list of such firms. Unfortunately, our authorities do not permit us to participate to any greater extent in providing this evaluation. I am pleased to have been of some assistance to you in this matter. Please feel free to contact us if you have further questions.

Sincerely,

MAX R. JANARO, JR.
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is The Adjutant General's Office.

REFERENCE OR OFFICE SYMBOL	SUBJECT
ORPED-FS	Cuba Lake Dam, Cuba, New York

TO: Files FROM: M. Fausold DATE: 5 January 1977 CMT 1

Mr. Fausold/rl/6945

1. In response to a letter request from Mr. Norman Ungermann, Director, Cuba Lake Cottage Owners Association, I visited Cuba Lake for the purpose of conducting a brief visual inspection of the dam and advising the property owners as to its apparent general condition. The dam and lake are presently owned by the New York State Park Commission and operated through the Regional Administrator for Allegany State Park, Mr. Roland Block. It is understood that the State Park Commission is contemplating divesting itself of the responsibility for the lake and the Cottage Owners Associated is considering accepting it.

2. Cuba Lake Dam is located 1.9 miles north of Cuba, N.Y. and about 13 miles northeast of Olean, N.Y. on the headwaters of Oil Creek. According to local information, the dam was originally constructed in 1858 to provide water for the Genesee Valley canal. Original height and length were 56 feet and 2,000 feet, respectively. Subsequent expansion in 1869 and 1872 resulted in a structure which was, according to an 1890 State Engineer Office report, 65 feet high and 2,200 feet long. No further changes to the embankment are known and the 1890 values are presumed correct. It is further reported that the structure has a core of puddled clay, while the nature of the material forming the shell surrounding the core is unknown. The upstream face is protected by stone riprap. The controlled outlet works consists of two pipes, visually determined to be cast iron and 30 inches diameter, discharging through a valve house into a ditch which formerly led to the canal. The spillway is located in a natural saddle at the far end of the lake, about two miles from the dam. It discharges down a small valley into Oil Creek 1.7 miles west of the town of Cuba.

3. My inspection took place on 14 December 1976. Present were Mr. Ungermann, Mr. A. J. Tuttle (Chairman of the Owners Association), Mr. Richard Bradley (Allegany State Park Commission), and several other members of the Association. We walked the length of the crest, examined the upstream slope, walked the downstream toe in the lower portion of the valley, examined the outlet valve house, and inspected the spillway.

4. The embankment appeared in good condition, without erosion from either runoff or wave action. The structure is thin, with a crest width of only 8± feet and side slopes which appear to range from 1½:1 to 2:1 on both faces. The principal deficiency present is the heavy growth of large trees and some light undergrowth over virtually all of the embankment. The stone riprap on the upstream face is in satisfactory condition. No evidence of seepage was present on the embankment or at the immediate toe. However, a short distance below the toe, a deep swale runs parallel to the dam. In this swale, evident seepage is emerging in several locations. Quantities are moderate, the water appears clear, and there is every indication that the condition has been stable over a considerable period.

Incl 1

DA FORM 1 FEB 62 2496 REPLACES DD FORM 96, [illegible] ISSUED AND USED UNTIL [illegible]

5. The outlet works pipes run through the dam perpendicular to the axis, and are about 1 foot apart at the spring line. They are controlled by a hand-operated valve at the outlet of each pipe. These have not been used in a great many years; however, several years ago local youths succeeded in opening one. It was closed again, and may therefore be considered operable to some degree. This could provide a means of draining the lake if required. One of the valves was leaking moderately, which prevented observation of any leakage around that pipe, while some slight flow was evident around the perimeter of the other pipe. The pipes empty into a masonry basin which appears in excellent condition, except for accumulated trash.

6. The spillway consists of two adjoining sections. A broad-crested, uncontrolle concrete weir about 90 feet wide at elevation 1545 is the principal feature. Two separate sluiceways, each about 6 feet wide, permit flow to pass the spillway as low as about elevation 1539. These waterways are fitted with stop-logs to control the lake surface elevation. During the summer the lake is maintained at elevation 1545 with all stop-logs in place, while during the winter it is lowered to about 1541. It is not presently possible to lower the lake below this elevation because siltation has created a sandbar across the spillway approach at approximately that elevation. The spillway weir and stop-log gate concrete was in good condition and the installation appeared well-maintained. A highway bridge some 60 feet downstre presents a constriction to outflow and undoubtedly has a capacity much lower than the spillway; however, the deck of the bridge and elevation of the approach roadwa are only about five feet higher than the spillway crest and would prevent any wate surface significantly higher than about 1550. The embankment crest elevation is about 1560. All above elevations are estimated from elevations and contours on the U.S.G.S. Quadrangle Map of the area.

7. In order to obtain a comprehensive appraisal of the adequacy of the existing structure and evaluation of the remedial actions which must be undertaken in order to have full confidence in the safety of the structure, it will be necessary to conduct investigations and analyses which are beyond the scope of the Corps' authority under these circumstances. This was explained to those present, and they were informed that a number of consulting firms exist with experience and adequate expertise to undertake such a study. Items which such a study should particularly address include:

a. Determination of embankment stability, which will in turn require sampling and shear testing of embankment material and determination of the piezometric prof

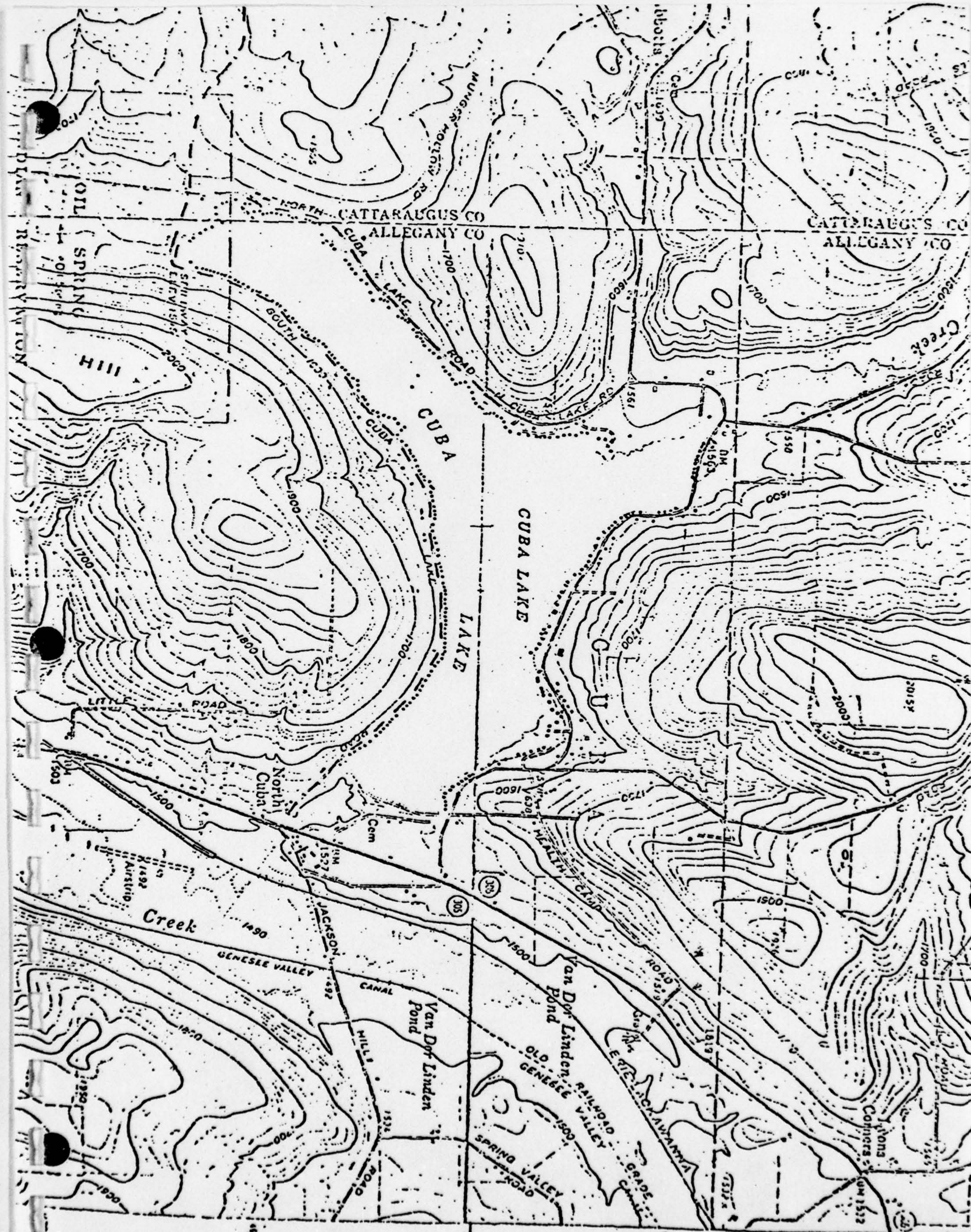
b. Investigation of all identified sources of seepage, particularly around th outlet pipes, and consideration of relief measures.

ORPED-FS 5 January 1977
Subject: Cuba Lake Dam, N.Y.

c. Hydrologic Studies confirming the adequacy of the spillway.

d. Identification of necessary maintenance work, such as clearing growth from the embankment and possibly reconditioning the outlet valves, necessary to restore safe operating conditions.

MARSHALL FAUSOLD
Chief, Soil Section


NORTH
CATTARAUGUS CO
ALLEGANY CO
CATTARAUGUS CO
ALLEGANY CO
CUBA LAKE ROAD
SOUTH CUBA LAKE
CUBA
CUBA LAKE
LAKE
LITTLE ROAD
North Cuba
Cem
Creek
GENESEE VALLEY CANAL
JACKSON HILLS ROAD
Van Der Linden Pond
HEALTH CAMP ROAD
OLD GENESEE VALLEY RAILROAD GRADE
ERIE LACKAWANNA
SPRING VALLEY ROAD
Lyons Corners
OIL SPRING
HILL
RESERVATION
Airstrip
1700
1800
1900
2000
1500
1600

WILLIAMS, SPRAGUE & HULBURT
ATTORNEYS AND COUNSELORS AT LAW
21-25 WEST MAIN STREET
P. O. BOX 105
CUBA, NEW YORK 14727
TELEPHONE 716 - 968-1

FRANK W. WILLIAMS
[illegible] R. SPRAGUE
K. HULBURT

April 1, 1977

C. Cullen Moncreiff, P.E.
Edwards and Moncreiff
482 South Cascade Street
Route 219
Springville, New York 14141

Dear Doug:

We are Attorneys for the Cuba Lake Cottage Owner's Association and are trying to work out alternative suggestions as to what to do with Cuba Lake, I know you are aware of the aquatic weed problem and the possibility of State giving up the Lake. We are getting real estate appraisals from various lots around the Lake. In December of 1976 the United States Army Corps of Engineers sent a representative to take a very quick look at the earthen dam which creates the Lake and at the spillway. The Corps of Engineers cannot do anything more but recommended extensive engineering studies, digging into the dam, reviews, etc. The Cottage Owners cannot afford that kind of study and have some real reservations about the practicality of digging holes in a dam that is currently doing a pretty good job of holding water.

I have learned that large tree growth on an earthen dam is an undesirable factor because the larger roots create channels and courses for water to follow to commence erosion. The dam is over 100 years old and has been fairly successful so far. I could get a copy of the Engineering Report prepared by the Corps of Engineers after the one day look at the dam if you are interested invidea I have.

I wonder if you could, or if you could put me in touch with some Engineering Firm which could, make a fairly long term study of Cuba Lake on the basis of observing it throughout an entire season, this would require an engineer to look at the dam in the spring, in the summer, in the fall and in the winter but not to undertake digging, test boring and the like? From such an observation of the various seasons and weather conditions would it

WILLIAMS, SPRAGUE & HULBURT
ATTORNEYS AND COUNSELORS AT LAW
21-25 WEST MAIN STREET
P. O. BOX 105
CUBA, NEW YORK 14727
TELEPHONE 716 - 9[illegible]

[illegible] W. WILLIAMS
P[illegible] R. SPRAGUE
PETER K. HULBURT

April 1, 1977

C. Cullen Moncreiff, P.E.
Edwards and Moncreiff
Page -2-

be possible to prepare a reasonably reliable report concerning the dam covering the following points:

a) Current condition,

b) Recommendations as to maintenance within the next two or three years, (such as recommending cutting the tree growth, possibly recommending topsoil and heavy rooted grass and even periodic mowing),

c) Recommendations for mechanical structures in the dam and at the spillway, repair and maintenance required and

d) Other related considerations.

I have not taken this proposal up with the Directors but I thought I would present it to you first, would it be possible for a fee of between $500.00 and $800.00 to get something like this in hand within a year so that the Cottage Owner's Association might make a reasonably well founded decision as to whether or not it would be desirable to push to have the dam turned over to a local government such as the Town of Cuba or to a local District such as a District to be formed which might be known as the Cuba Lake Park District?

Very truly yours,

WILLIAMS, SPRAGUE & HULBURT

By Peter R. Sprague

PRS:jld

CONFERENCE CONCERNING CUBA LAKE

DATE JUNE 16, 1977

PLACE CUBA, N.Y.

DAM INSPETION

	NAME	ORGANIZATION	MAILING ADDRESS	TELEPHONE
1.	Peter R. Sprague	Cuba Lake Cottage Owners	Box 105 Cuba, N.Y. 1477	716-968-
2.	Wm Morgan	Cottage Owner	345 Cuba Lake	9681
3.	AJ Tuttle	COTTAGE OWNER	66 S. SHORE CUBA N.Y. 14727	968-12
4.	George Koch	N.Y. S. BANK CONS.	50 WOLF RD ALBANY N.Y.	(518) 457-1
5.	BERNARD E. STOUT	CUBA LAKE COTTAGE OWNER ASSOC.	80 SOUTH SHORE RD CUBA N.Y. 14727	-716- 968-213
6.	Ralph E Lange	Cottage Owner	341 N. Shore	968-2
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

October 3, 1916.

Mr. Arthur S. Hopkins,

Department of Lands and Forests,

Conservation Commission.

Dear Sir:-

Mr. McKim inspected the Cuba dam on September 27, 1916. There was a little water flowing over the dam, which may have caused the leak, or it may have been caused by water which passed through the dam or around the abutment.

Will you have your Superintendent draw the water down a few inches, so as to stop the water flowing over the spillway, and ask him to afterwards examine the leak to see if it has decreased to any extent. I would not have the dam drawn down more than a couple of inches below the crest of the spillway, for, if it is drawn down more, it may stop the leak at another part.

Very truly yours,

GEO. D. PRATT, Commissioner,

By

Division Engineer.

McK/C.

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

July 9, 1913.

Mr. Geo. P. Decker, Asst. Counsel,

Conservation Commission,

Albany, N. Y.

Dear Sir:-

Following our interview of this date on the subject of Cuba Reservoir, beg to say that the area of the reservoir or lake with the water at the crest of the weir or overflow is about one square mile. If the water were drawn down 5 ft., the area would of course be considerably less. One square mile of water 5 ft. deep would produce four-tenths (.4) of a H. P. continuously, or on 100 ft. head would produce forty (40) H. P. 24 hours per day 365 days in the year.

To draw down the lake 5 ft. at any time between, say, the latter part of May and the latter part of October would destroy the value of the lake as a pleasure resort. For quite a number of years past the lake has not been drawn down, consequently, excepting in extreme high water when for brief periods the surface was higher than the overflow, the elevation of the surface of the lake has been but slightly above the overflow weir, and almost uniform at that elevation throughout the six months, or say of the pleasure

season.

To limit the draft from the lake for power purposes so as to prevent the surface of the lake at any time being less than 5 ft. below the elevation of the weir would, in my opinion, furnish so small an amount of power that any value which such power might have would not be commensurate with the injury to the pleasure interests.

Yours very truly,

R W Sherman

RWS/F

Chief Engineer.

ROCHESTER, N. Y., July 2nd, 1913.

Mr. George E. Van Kennan, Chairman,
Conservation Commission of State of New York,
Albany, N. Y.

My dear Mr. Van Kennan:-

I wish to thank you for your very kind letter of June 25th, in regard to the situation at Cuba Reservoir.

So far as we are concerned, the greatest value to us in the use of the Cuba Reservoir and storage of the water for hydraulic purposes would be to begin using it about the first of August in moderate quantities and still use the full storage in the fall, as this is the time we have the greatest use for it, and it would not interfere with the Reservoir making a beautiful lake for the summer campers. In other words, I believe that we could combine the two. Of course, the combination will make the benefit less in each case. It would slightly interfere with the beauty of the Reservoir as a summer resort, and the holding up of the water into September would interfere somewhat with the value as a water storage proposition. However, as above stated, I believe the two could be combined so as to meet the objections of those having the cottages around the Reservoir, and at the same time give to the State a return for the stored water for power purposes.

If you could refer us to some of the records of your department as to the amount of water available, or refer me to some one in your department to whom I could send one of our Engineers, we should be very glad to make you a proposition along the lines outlined.

Yours very truly,

Jas. T. Hutchings

General Manager.

Referred to Mr Decker for Examination and report to me July 9th 1913

Geo E Van Kennan

July 9,1913.

James T.Hutchings, Gen. Mgr.

Rochester Railway & Light Co.

Rochester,N.Y.

Dear Mr Hutchings:

Chairman Van Kennen has requested me to acknowledge receipt of your favor of the 2nd inst. to him in the matter of the Cuba Reservoir and say that your suggestion that there might be a system of storage for the benefit of the Genesee River combined with the policy of park uses of the Cuba Reservoir, will be taken up and given careful consideration. We will have the records of the available water gathered together and supplied to you.

Yours very truly

Assistant Counsel

GPD-F

State Engineer's Report, see Assembly Document no.137 for the year 1880.

State Engineer's Report on Canal Feeders, see Assembly Document no. 109, year 1852.

State Engineer's Report on flow from Cuba Reservoir in State Engineer's Report for year 1863 at p.221.

Extract from report of Chief Engineer of Conservation Commission under date of Jan. 10, 1913.

"From the reports of the State Engineer it appears that the original reservoir had an area of 470 acres and an average depth of about 25 feet; that in 1864 the flow line was raised three feet and in 1869 it was raised six feet more increasing the area to 800 acres. In 1872 a further increase of two feet was made but the increased area is not given. The Genesee Valley Canal was abandoned in 1878 . . . . .

"Shortly after the Johnstown flood the spillway was lowered either six or eight feet to its present elevation. There are no maps available showing the present area but it is probably not more than 500 acres. The tributary drainage area as shown by Beer's County Atlas dated 1869 is about 24 square miles. The reservoir is formed by an earth dam about 1750 feet long and 55 feet high across the Oil Creek Valley. The outlet works consist of two - 24 " cast iron pipes through the dam to a gate house at the foot of the embankment. From here a feeder canal formerly connected the reservoir with the Genesee Valley Canal. The spillway is located at the westerly end of the reservoir and discharges into an artificial channel which in turn empties into a brook and finally into Oil Creek about two miles below the village of Cuba. Both the dam and the spillway are in a good state of repair. . . . . .

"The original spillway was but 110 feet in length but when repairs were made in 1895 the length was increased to 210 feet. The concrete apron was built about 1904. The highest flood line known since the spillway was increased to its present length was between two and three feet above the spillway crest."

July 10,1913.

James T.Hutchings, Gen. Mgr.

Rochester Railway & Light Co.

Rochester,N.Y.

Dear Mr Hutchings:

As promised in my letter of yesterday I enclose references to State Engineer's Reports of various early dates wherein you will be able to find data as to the storage capacity of the Cuba Reservoir. I also enclose extracts from a recent report of our engineering bureau on the subject. In view of the many changes which you will observe have been made from time to time in the height of the dam you will,of course, be guarded in the deductions which you draw from figures as to storage capacity as of different dates. We assume that you will be able to find the early reports cited by consulting the Rochester libraries. I think you will find very full sets of the State Engineer's Reports and of legislative documents in the Reynolds library if not elsewhere. We will be glad to furnish you with anything further which we may have, although I have now referred to everything that I am able to find.

Yours very truly

GWD-F

Assistant Counsel.

Memorandum of maps and surveys of the lands appropriated by the state for the Cuba, otherwise known as Oil-Creek Reservoir, in the office of the Division Engineer for the canals in Triangle Building, Rochester, N.Y.

Map no.3123. Set of unbound sheets showing by sections the whole of the property with blue line and flow line and parcels appropriated from private owners. These sheets are undated but annotation indicates that they were made pursuant to chapter 342, laws of 1863, in connection with appropriations additional to the original appropriations in order to provide for the raising of the dam three feet as directed by said act.

Map no.748. no.1124. Recent map of outlet creek leading from the reservoir to Oil Creek.

Roll map no. 86. Survey of a road and accompanies no.748.

Map no.3077. Plan for lengthening spillway under chapter 932, laws of 1895.

Map no. 3282. Survey of a washout at the spillway made Sept. 3-5, 1902.

Map no. 3354. Survey of damages made May 14, 1903.

Field Book 878. Survey of a cut across lands of Richardson and Rogers made June 1901.

Map no. 538. Plan of dam and bulkhead made in 1871.

Map no.497. Plan of outlet oulvert made April 20, 1852.

Maps nos. 861 and 865. Made in 1851 on small scale and show the whole of the reservoir, the original creeks, blue line, highways and original land owners and parcels appropriated from them.

Map no.865 shows the outlet and the reservoir dam in 1851.

Map no.950. Shows on small scale map of the whole reservoir and of the vicinity but has no date.

Map no. 1233. This is a large map showing the reservoir and road lines on a large scale.

Map marked for the purposes of this reference "AAA". This is an old map on a single sheet contained in book of plans of Genesee Valley Canal and shows blue lines of the reservoir property and the boundaries of parcels appropriated.

The reservoir and the lands appropriated for it lie mostly

in Allegany county but partly in Cattaraugus county. Reference to the clerk's records of these two counties to find deeds to the state or records of appropriations of lands taken may be necessary but maps nos. 3123, 861, 950 and 1233 above referred to show in detail the blue lines and courses and distances thereof from which it would appear that a location on the ground of the outbounds of the holding of the state's lands could be made. It would appear from these maps that the highway which encircles the reservoir lies in places within the blue line and in other places outside the blue line.

In calling at the Division Engineer's office ask for Mr Zorsh who is familiar with the records above referred to.

Dated May 20,1913.

Assistant Counsel.

STATE OF NEW YORK — CONSERVATION COMMISSION

SUBJECT ..... FILE NO.

Acc. No. M 5062

COMPUTER ..... 19 ..... CHECKED BY 19

MADE IN CONNECTION WITH .....

REFERENCE Maps Acc. 867588576 and correspondence, etc. CONT'D FROM ACC.

Drainage Area: 28 Square miles (Ref - Memo by E. H. Sargent)

Maximum Probable Inflow:

Fuller's 100 yr. flood with watershed coefficient of .80 = 8,800 c.f.s.

McKims formula: 270 cfs./sq. Mi. x 28 Sq. Mi. = 7,560 c.f.s.

Erie, Pa. flood of Aug. 3, '15: 800 x 28 Sq. Mi. (Rate used is for a 10 sq. mi.) = 22,400 c.f.s.

Spillway Capacity: $(111' \times 9.58'') + (100 \times 8\tfrac{1}{4})$ (22 ft. 66)

Assuming value of 2.46 for "C" in Francis formula:

$Q = 2.46 \times (111 - .958) \times 29.65 = 8,040$ c.f.s. (110.04)

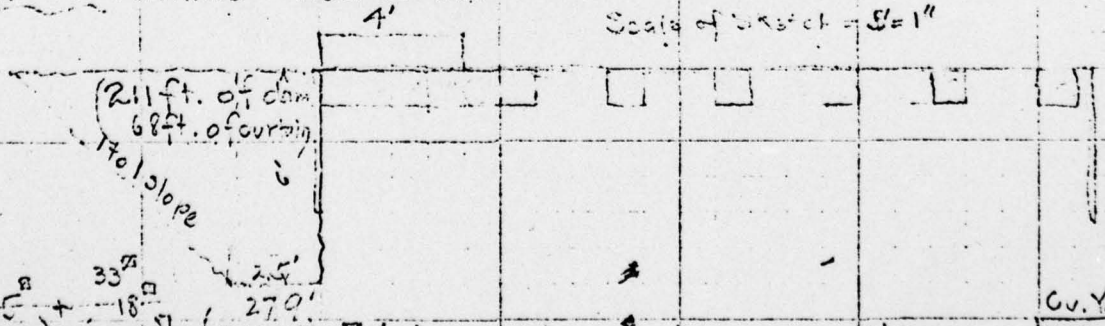
$Q = 2.46 \times (100 - .8) \times 22.63 = 5,530$ c.f.s. (99.2)

Total probable spilling capacity = 13,570± C.f.s.

Such value is 54.2% in excess of Fuller's maximum.

Seemingly ample.

Excavation to examine timber structure:



$\left[6 \times 2.5 + \left(\frac{2.5}{2} \times 6\right)\right] \times \frac{(211+68)}{27} = 341$ cu. yds. earth excavation, or say 350 Cu. Yd.

$18 \times \frac{279}{27} \times (211+68) = 186$ " " clay puddle, " " 190

$15 \times \frac{279}{27} \times (211+68) = 155$ " " concrete cut off wall, " " 160

Furnishing and placing of say 100 " " sand, gravel or well compacted ; 100

or clay.

of the Cuba Lake Dam.

Buffalo Express Nov. 5, '11.

The people of the village of Cuba are interested in the visit here of Alexander R. McKim, state inspector of dams and docks, to inspect the Cuba Lake dam. That the dam must be riprapped for safety is the opinion of Mr. McKim.

He says that at present a cloudburst might cause a repetition of Austin and Johnstown, but that under ordinary conditions the dam is safe if properly cared for.

Mr. McKim holds that the dam is a useless sheet of water and that it is up to the people as to whether they wish it retained. He said repairs would not exceed $10,000, which the state would pay after proper legislation. He recommends further repairing of the spillway at the southern side also.

Cuba people dislike to have the dam emptied as it would remove the only lake camping place in this section. About 300 cottages surround the lake. The dam is on state lands and was originally a feeder for the Erie canal.

Franklinville, N.Y. Nov. 3, 1911.

Following the Austin disaster Cuba people became alarmed about the dam which holds back the water of Cuba Lake, and state officials were sent on from Albany to make an investigation. Engineer Govern, who made the investigation said to a Patriot reporter:

As the water stands at present the dam is sufficiently strong, but the danger lies in the event of a sudden cloudburst that might pile the lake full before it could run out at the spillway. Mr. Governs' plan is to make the dam safe and at the same time preserve the lake as a pleasure resort by lowering the spillway ten feet and widening it to several times its present width.

The people of Cuba do not want the lake drained as it is a pleasure resort which is a source of enjoyment to many. At the same time the sentiment is unanimous that they do not care to run any chance that "Great Cuba Catastrophe" shall be a headline in the newspapers at any time near or distant.

INSPECTS CUBA DAM

Bolivar Breeze, Nov. 2, '11.

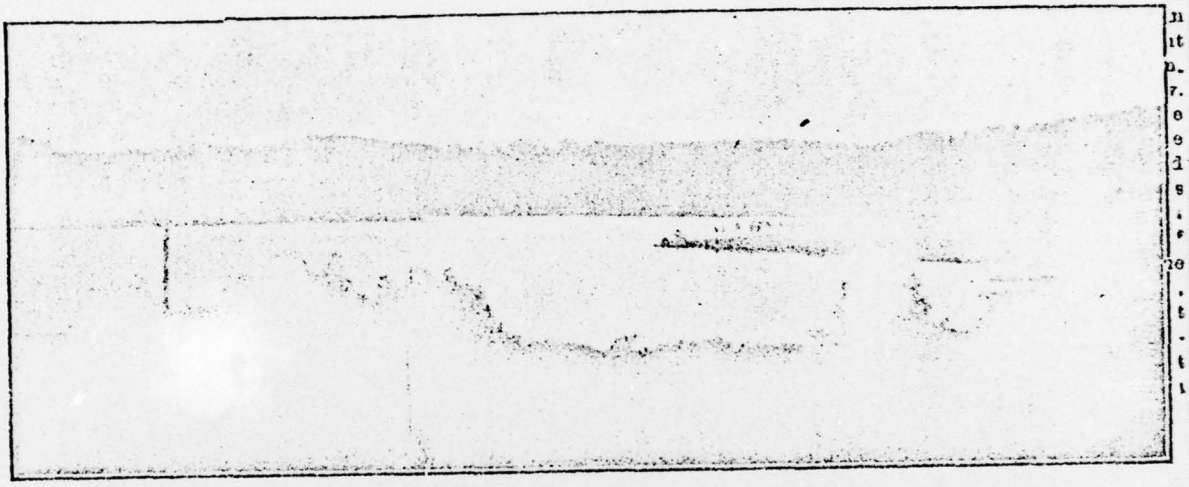
Deputy Superintendent of Public Works and An Engineer Visit Cuba Lake.

Charles McDonough, assistant superintendent of public works, El J. Govern, engineer of Western Division, Erie canal, and Maurice Sheehan, inspector of masonry, were in Cuba and

Friendship, N.Y. Vidette

Deputy Sups. of Public Works and an Engineer Make Inspection of Dam and Reservoir

Charles McDonough, assistant superintendent of public works, El J. Govern, engineer of Western Division Erie canal, and Maurice Sheehan, inspector of masonry, were in Cuba and at Cuba Lake last Thursday, October 19, making an inspection of the state dam, the spillway and the water course. Mr. McDonough



CUBA LAKE.—TO BE DRAINED OR $10,000 SPENT ON ITS DAM FOR SAFETY.

ing by thousands of tons the pressure upon the dam, and also to the same extent the amount of water to rush through, and the resulting destruction.

Mr. Govern's plan to make the dam safe and at the same time to preserve the lake as a pleasure resort, is to lower the spillway ten feet and widen to several times its present width. This method says Mr. Govern would relieve the pressure on the dam and afford an ample outlet in case of a sudden cloudburst.

People of Cuba do not want the lake drained as it is a pleasure resort which is a source of enjoyment to many. At the same time the sentiment is unanimous that we do not care to run any chance that "Great Cuba Catastrophe" shall be a headline in the newspapers at any time near or distant. There is little need to lull ourselves into security with the mistaken notion that no damage would be done. There is an enormous amount of water in Lake Cuba and if it ever should break away the result would be fearful.

The Patriot hopes that Mr. Govern's plan will be adopted, and the spillway lowered and widened. This plan is economical, and would preserve the lake and obviate all risk.

Rushford Inspector, Nov. 2, 1911.

Inspecting the Dam at Cuba Lake.

State men were at Cuba last week inspecting the dam and spillway at the reservoir and while they considered the dam safe they thought it would be well to lower the spillway ten feet and widen it considerably

The inspectors thought there was no danger from the dam now, but in event of a cloudburst it might give pressure upon the dam, and also to the same extent the amount of water to rush through, and the resulting destruction.

Mr. Govern's plan to make the dam safe and at the same time to preserve the lake as a pleasure resort, is to lower the spillway ten feet and widen to several times its present width. This method, says Mr. Govern, would relieve the pressure on the dam and afford an ample outlet in case of a sudden cloudburst.

People of Cuba do not want the lake drained as it is a pleasure resort which is a source of enjoyment to many. At the same time the sentiment is unanimous that we do not care to run any chances that "Great Cuba Catastrophe" shall be a headline in the newspapers at any time, near or distant. There is little need to lull ourselves into security with the mistaken notion that no damage would be done. There is an enormous amount of water in Lake Cuba and if it ever should break away the result would be fearful.

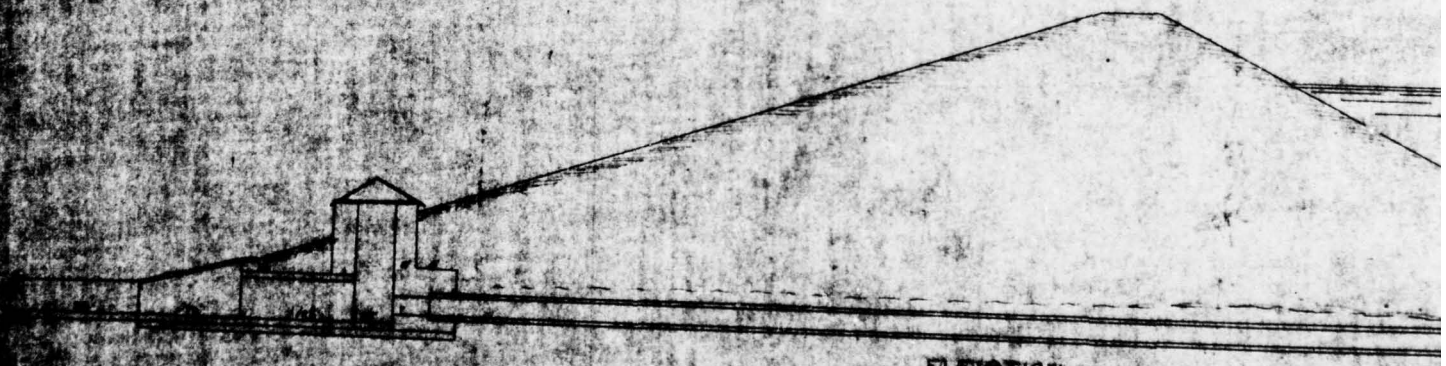
The Patriot hopes that Mr. Govern's plan will be adopted, and the spillway lowered and widened. This plan is economical and would preserve the lake and obviate all risk.

Wellsville, N.Y., Nov. 1, 1911.

The dam at Cuba Lake has been inspected by a state representative and although no report has been filed we believe the engineer will recommend lowering the dam and broadening

APPENDIX E

CONSTRUCTION DRAWINGS

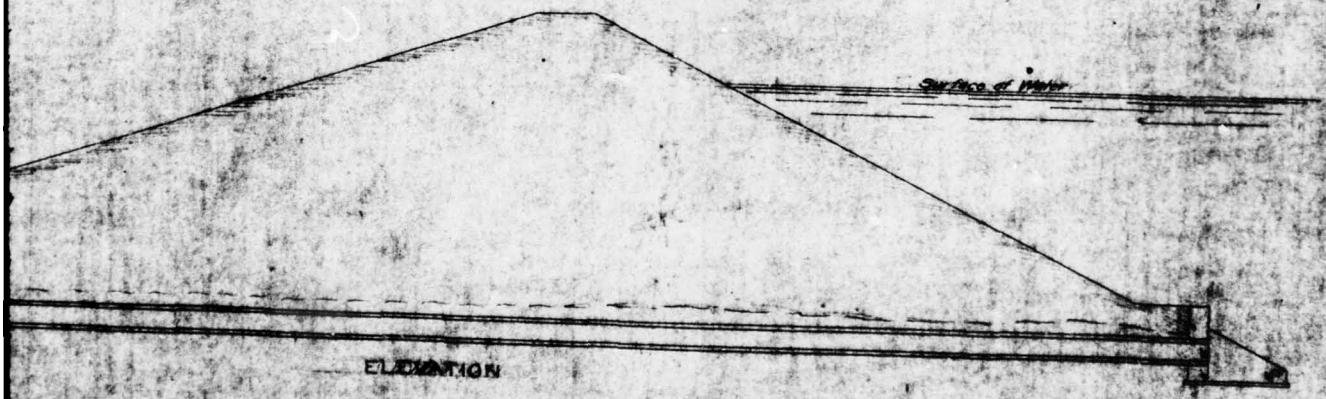


ELEVATION

Details not traced.
PAW

Exhibited for bidding
at Cuba Nov 18 1851
Orville W Gray
Resident Engr
J R Slattery Div Engr

PLAN OF
DISCHARGE WORKS
FOR
GILCREEK RESERVOIR



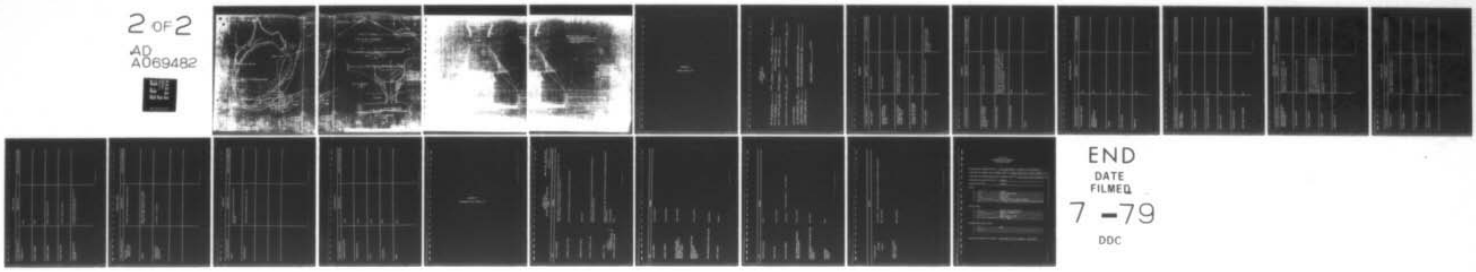
ELEVATION

Details not traced.
AHB

AD-A069 482 KIMBALL (L ROBERT) AND ASSOCIATES EBENSBURG PA F/G 13/2
NATIONAL DAM SAFETY PROGRAM. CUBA LAKE DAM, (INVENTORY NUMBER N--ETC(U)
JUL 78 R J KIMBALL DACW51-78-C-0025

UNCLASSIFIED NL

2 OF 2
AD A069482



END
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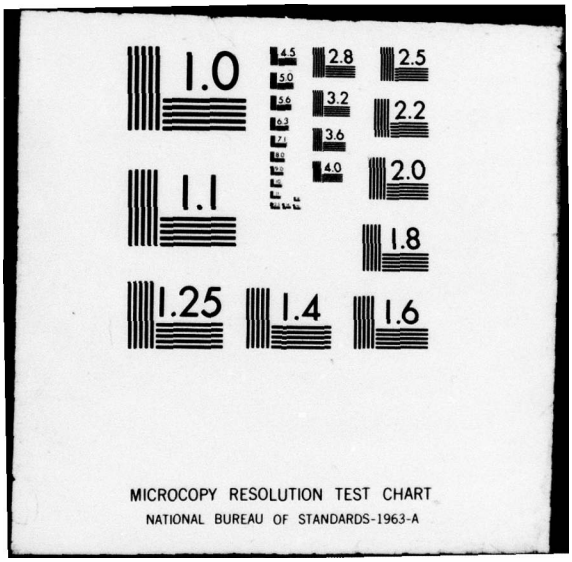
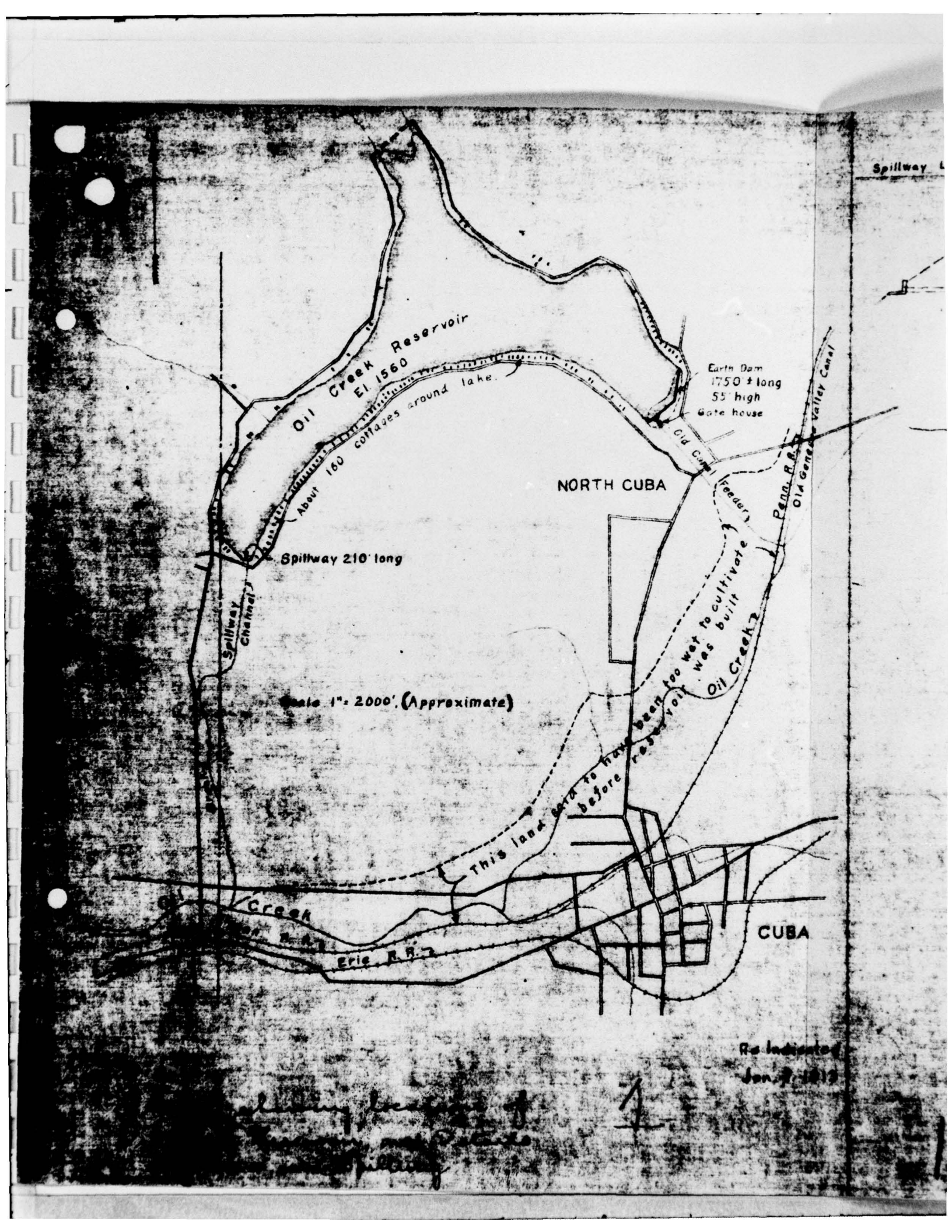
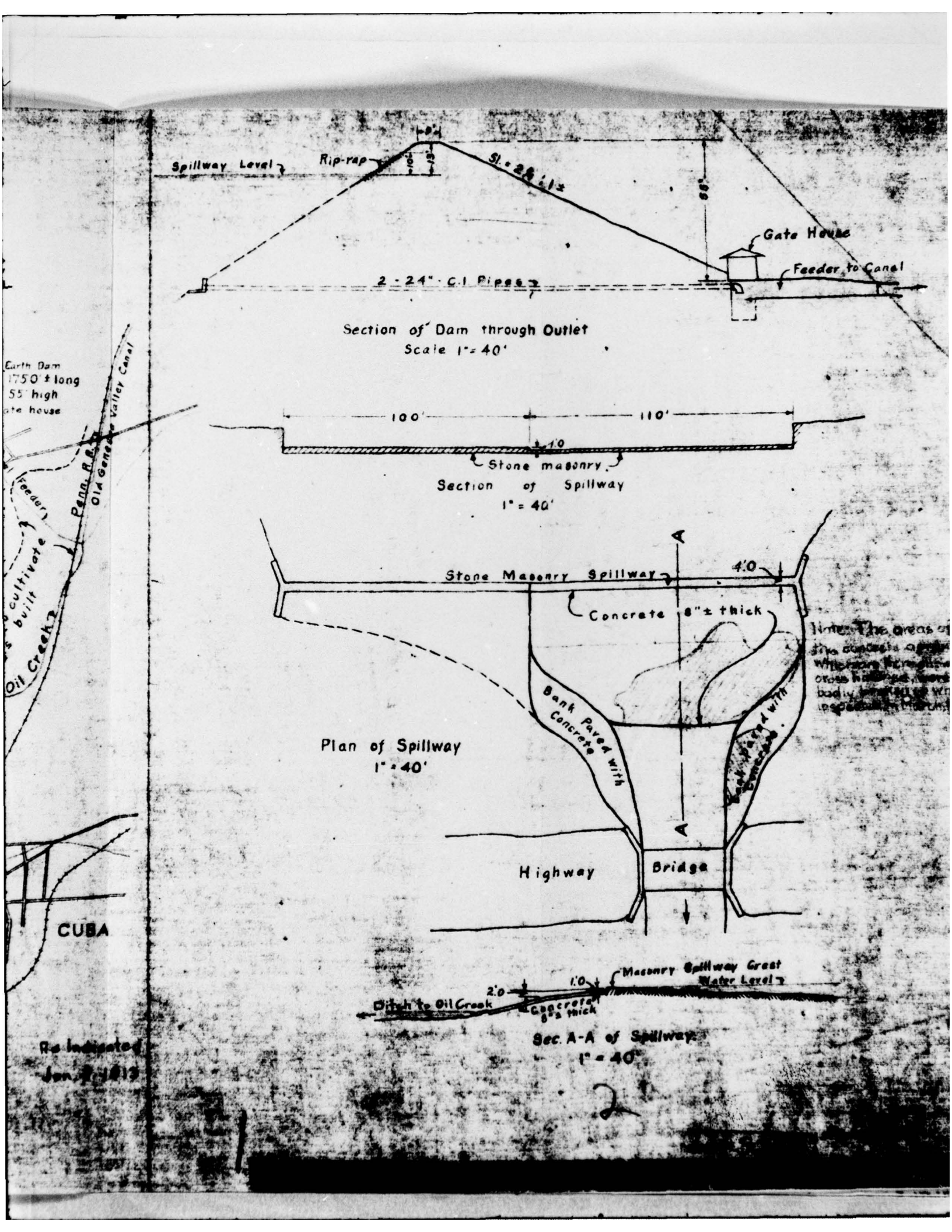
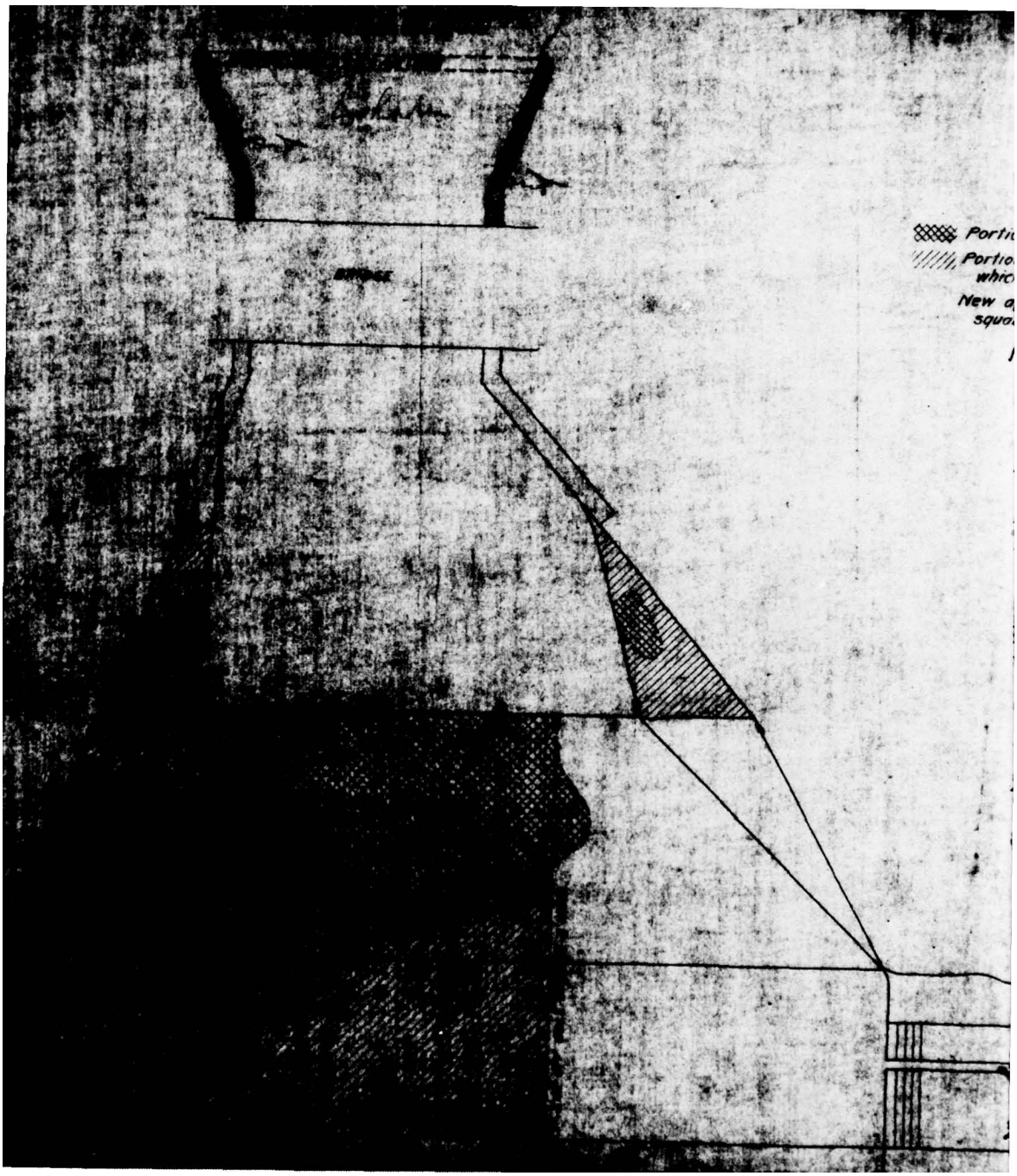
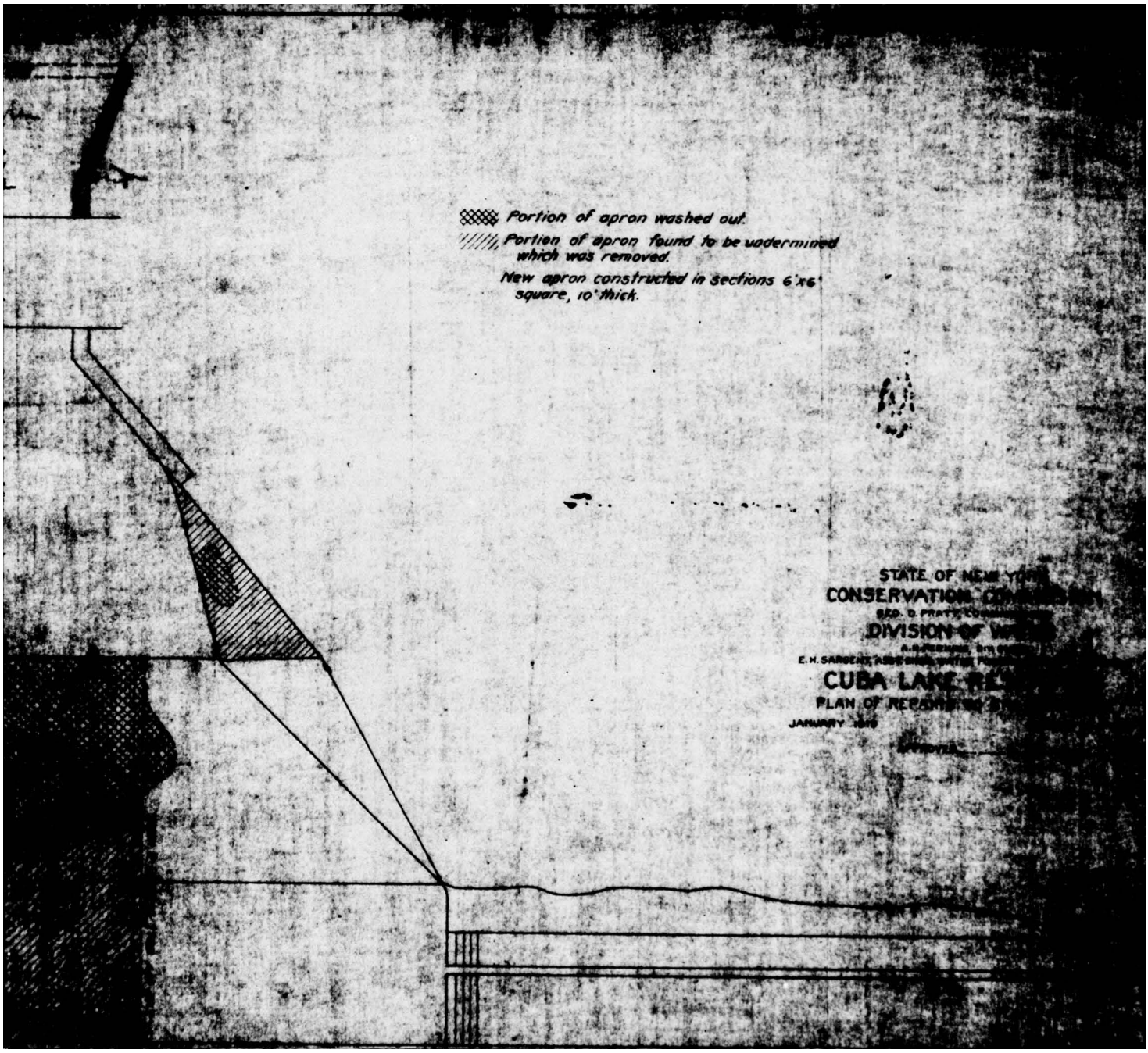

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A


Oil Creek Reservoir
El. 1560
About 160 cottages around lake.
Earth Dam
1750 ± long
55' high
Gate house
Old Canal Feeder
Penn. R.R.
Old Genesee Valley Canal
NORTH CUBA
Spillway 210' long
Spillway Channel
Scale 1" = 2000'. (Approximate)
This land said to have been too wet to cultivate before reservoir was built
Oil Creek
Creek
Erie R.R.
CUBA
Re Indicated
Jan. 7, 1913


Spillway Level
Rip-rap
Sl. = 2½ : 1 ±
55'
Gate House
Feeder to Canal
2 - 24" C.I Pipes
Section of Dam through Outlet
Scale 1" = 40'
Earth Dam
1750' ± long
55' high
Gate house
Penn. R.R.
Old Genesee Valley Canal
Feeder
Oil Creek
CUBA
100'
110'
1:0
Stone masonry
Section of Spillway
1" = 40'
Stone Masonry Spillway
4:0
Concrete 8" ± thick
Bank Paved with Concrete
Bank paved with Concrete
A
A
Plan of Spillway
1" = 40'
Highway
Bridge
Masonry Spillway Crest
Water Level
1:0
2:0
Ditch to Oil Creek
Concrete 8" thick
Sec. A-A of Spillway
1" = 40'
Re Indicated
Jan. 2, 1913


Portio
Portio
whic
New a
squa


Portion of apron washed out.
Portion of apron found to be undermined which was removed.
New apron constructed in sections 6'x6' square, 10' thick.
STATE OF NEW YORK
CONSERVATION
DIVISION OF
CUBA LAKE
PLAN OF
JANUARY

APPENDIX F

VISUAL CHECK LIST

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME DAM Cuba Lake Dam COUNTY Allegany STATE New York ID# 455

TYPE OF DAM Earthfill HAZARD CATEGORY High

DATE(s) INSPECTION June 12, 1978 WEATHER Clear-Hot TEMPERATURE 90°

POOL ELEVATION AT TIME OF INSPECTION 1,545 M.S.L. TAILWATER AT TIME OF INSPECTION None M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - LRK

James T. Hockensmith - LRK

Tom Donahue - Olean Times

Paul Backman - NYS Park and Recreation Comm.

Cliff Brug - NYS Park and Recreation Comm.

James T. Hockensmith RECORDER

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Numerous minor sloughing and erosion all over upstream and downstream slopes.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Appeared to be good.	
RIPRAP FAILURES	Rip rap has failed in several places.	After Agnes flood rip rap was replaced with gabions in places.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appeared to be good and stable	
ANY NOTICEABLE SEEPAGE	Most of the toe area had standing water. Several areas had wet spots and seeps on embankment above toe. One place 100 ft. east of valve house has extensive seepage (estimated in excess of 1,000 GPD).	
STAFF GAGE AND RECORDER	None	
DRAINS	None	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	
STAFF GAGE OF RECORDER:	N/A	

OUTLET WORKS - Principal Spillway

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Two 24 inch cast iron pipes - not inspected; constantly full, under pressure in the embankment.	
INTAKE STRUCTURE	Below water level - details unknown	
OUTLET STRUCTURE	Valve house at toe of embankment has two valves which control flow through pipes. Right pipe is leaking at stem and reportedly was opened 2 years ago. Left pipe has not been operated for some time.	
OUTLET CHANNEL	Fairly wide with approximately 15 homes downstream.	
EMERGENCY GATE	None except outlet works.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Broad crested weir (9 1/2' wide) 102 ft. long, apparently in fair condition.	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	Concrete lined for approximately 100 feet in good condition.	
BRIDGE AND PIERS	Highway bridge 100 feet below weir. It should have no effect on flow.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	None	
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	Same as ungated spillway	
BRIDGE AND PIERS	Same as ungated spillway	
GATES AND OPERATION EQUIPMENT	Stop logs are installed and taken out to raise or lower lake level.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Fairly wide with approximately 15 homes.	
SLOPES	Wide flood plain with slopes rising steeply at edge of plain - stable	
APPROXIMATE NO. OF HOMES AND POPULATION	15 homes - 60 people.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Flat and gentle around reservoir with cottages.	
SEDIMENTATION	Some near spillway below water level.	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

APPENDIX G

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Cuba Lake Dam

ID# 455

ITEM	REMARKS
AS-BUILT DRAWINGS	None available, some construction drawings on spillway repair - New York State Department of Environmental Conservation
REGIONAL VICINITY MAP	New York State Department of Environmental Conservation
CONSTRUCTION HISTORY	Interviews
TYPICAL SECTIONS OF DAM	Section of dam through outlet (no details), New York State Department of Environmental Conservation
OUTLETS - PLAN	Repair to Spillway, New York State Department of Environmental Conservation Dam Division
- DETAILS - CONSTRAINTS - DISCHANCE RATINGS	None Available
RAINFALL/RESERVOIR RECORDS	None

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available
POST-CONSTRUCTION SURVEYS OF DAM	None known
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	None available
HIGH POOL RECORDS	Interviews - Hurricane Agnes - 5' over spillway
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None known
MAINTENANCE OPERATION RECORDS	None

REMARKS

SPILLWAY PLAN	
SECTIONS	One profile - New York State Department of Environmental Conservation
DETAILS	None available
OPERATING EQUIPMENT PLANS & DETAILS	None available

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 25.3 square miles - wooded and agricultural

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): Summer 1545', winter 1536' (8200 ac-ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Top of dam 1559.5 (16,500 ac-ft)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1,559.5'

CREST:

a. Elevation 1,545'
b. Type Broad crested weir
c. Width 9 1/2 feet
d. Length 102 feet
e. Location Spillover 2 miles south of right abutment
f. Number and Type of Gates 2 gates - operated by removing the stop logs

OUTLET WORKS:

a. Type Two 24" cast iron pipes
b. Location Center of embankment
c. Entrance inverts 1505'
d. Exit inverts Approximately 1505
e. Emergency draindown facilities Same

HYDROMETEOROLOGICAL GAGES:

a. Type None
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Reportedly 5' over spillway - June 1972.